Introduction of Six Sector Studies' Volumes

Volume-5

Bangladesh's Designer Goods Industry, baseline, profile, Performance and plans for upgrading

Naeem Chowdhury, D.D.E (Cambridge) Ph. D (Cambridge)
Team Leader
CDS Team of Consultants

Volume-6

Bangladesh's Leather and Leather goods Industry, baseline, profile, performance and plans for upgrading

Naeem Chowdhury, D.D.E (Cambridge) Ph. D (Cambridge)
Team Leader
CDS Team of Consultants

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Bangladesh's Light Engineering
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Professor Dr. M. Kamal Uddin
CDS Team of Consultants

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Bangladesh's ***Electrical & Electronics*** Industry, baseline, Profile, Performance, and Plans for Upgrading

K Siddique-e- Rabbani, Ph.D
CDS Team of Consultants
&
Naeem Chowdhury, Ph.D
CDS Team of Consultants

Volume-5

Bangladesh's Designer Goods Industry baseline, profile, performance and plans for upgrading

Naeem Chowdhury, D.D.E (Cambridge) Ph. D (Cambridge)
Team Leader
CDS Team of Consultants

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By
Center for Development Studies, Dhaka

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Executive Summary

Results concerning the 'economics' of the designer goods sector

With an average 'headcount' of some 52 workers in the MiSmall class of firms, but with 230 workers in the MeLarge class of firms, Bangladesh's designer goods industry produces Tk. 29 billion worth of value added. The sector accounts for some 2% of the export receipts of Bangladesh. We estimate that as of 2007 there are 2906 enterprises/establishments in designer goods industry.[1] With an average firm age of 14 years as of 2007, this is not one of the oldest industries now in the private sector. While average size of firm ranges between 7 for the micro subsector to 55 for the small subsector to 72 for the medium subsector, the average size of the 'large' segment of the industry is a relatively humongously large size of some 667 workers.[2] At start-up, this industry was fiercely reliant on equity as opposed to debt, garnering almost all the capital used during the start-up year from own-account resources. About fifty percent of the establishments make a living as a contract manufacturers, while another 47% are own-account producers---with the remainder being in a dual-mode.

Overall, gross value of output per firm average Tk. 18.6 million among the own-account producers, while for the contract manufacturers, it is Tk. 33.4 million. Gross value added for the sample as a whole average at Tk. 12.18 million. More important, value added as a percent of gross value of output for the OAP firms is 55%, while for the CM firms, it is found to be 64%.

The 'economics' of the technological choices made by firms in leather sector

Average capital-labour ratio (CLR)---defined on the basis of replacement cost per worker employed---is found to be overall Tk. 71 thousand. The value for this ranges between MiSmall and MeLarge class of firms Tk. 82 and 223 thousand. Labour and machine productivity have been evaluated using physical units of a benchmark kind of homogeneous-output. The latter was obtained by 'chaining' output of what are relatively minor in revenue importance into units of the 'dominant' or 'benchmark' output in the firm's mix. Using such measures of average physical productivity, we find that such per-worker productivity monotonically rises across firm size classes from micro to medium establishments.

Comparative physical productivity of MiSmall *versus* MeLarge firms

Overall, MeLarge firms have a small advantage *versus* MiSmall class of firms in terms of average labour productivity estimates. The advantage of MeLarge is more pronounced when it comes to machine physical productivity. Using ratio between arithmetic mean based on values of output and input, we also estimate elasticity of physical output with respect both the number of workers employed and machines employed. MeLarge firms, respectively, out-produce MiSmall firms (have elasticities of 0.97 *versus* 0.84). Estimates of

[1] We those micro establishments with 'headcount' of less than 7 when it comes to grossing up from our sample estimates to the corresponding statistical universe of the entire industry. Failure to do so leads to the grossed-up amount of value added becoming more than 5 times BBS estimate of gross domestic product arising in designer subsectors---a quite unacceptable concoction.

[2] This estimate is no doubt due to some of the country's largest embroidering businesses being included in our sample. Omitting them from the sample would have pared back the average employment size of the sector quite significantly. It was not advisable to omit them because by doing so we would have exposed ourselves to the criticism of not have implemented the sample size that we had promised we would cover.

Cobb-Douglas production function are as follows: value of the exponent of natural log of labour used is 0.81; of fixed capital, .31; and materials, -0.01. All three coefficients are statistically highly significant, and F-ratio suggest that the functional form used is a highly satisfactory representation of the production surface. Tests convincingly suggested that returns to scale in this industry were constant. Its policy significance is that the state of competition among firms in this industry is on an even keel, and that therefore 'competition policy' ought to be off the charts in this case.

Factors driving the 'distance' from production frontier

Three factors were found to be promoting 'efficiency' in terms of the distance from the estimated production frontier, namely, worker experience, educational attainment of the Managing Director of the firm and bank loan status. Each returns a negative coefficient on the distance function.. This finding supports a programme for investing more by way of capacity building (especially on workers proficiency level).

Access-to-finance regime in the designer goods industry of Bangladesh

Average bank lending to MeLarge *versus* MiSmall firms has an advantage by a factor of more than two:one when the full sample is taken into account. Significantly enough, as compared with MiSmall establishments who are dwarfed in terms of the loan size, the rates of interests paid by MeLarge establishments are statistically equivalent to those for the MiSmall class (15.91% versus 15.93%).

Working capital provisioning *versus* requirements

Average working capital provisioning for the MeLarge firms enjoys an advantage of a factor of more than 4 times. Average capacity utilization ranges between 51.0% for the micro firms to a high of 73% for the large firms. MiSmall firms underutilize their own capacities by as much as 38%. That is the basis whereon we conclude that MiSmall are starved of finance to the tune of at least 38% of their requirements.

Structure of costs of operation

About 53% of the cost of operations are accounted for buying raw materials. Wages account overall for only 33.6%. Both cubic cost functions and flexible-form trans-logarithmic functions show that costs tend to rise in tandem with output but then falls. This implies that firms at low levels of output suffer from a competitive handicap: this is the stage of their life-cycle when they are relatively more vulnerable. This is when they need legitimate public assistance the most.

Factors that should enter into the formulation of a growth strategy for the sector

Demand for labour and capital

Labour demand is negatively affected by the prevailing wage rates. There is a strong case for the maintenance of policies that help stabilize wage rates at relatively low levels. Reservation price is about the minimum opportunity cost that is consistent with the worker being able to reproduce its labour-selling power and thus deciding to supply labour. Essentially, reservation price revolves around workers' cost-of-living. Clearly, there is a lot that public policy can do about workers' cost of living. Foremost among them is about leveraging the cost of food as a policy variable. Macroeconomic stability is needed urgently, so that the 'reservation price' of unskilled labour could be stabilized at low levels. The labour demand function is positively sloped in product price, fixed capital, and output, The latter is really another name for capacity utilization, and positively drives the demand for all factors of production, whether it is labour, capital or material input. This means that initiatives to promote the increasing of the capacity utilization are helpful. Automation drives the demand for labour downward.

Product price is about the quality and the design of the product, its workmanship, the use of more expensive, more attractive and yet more user-friendly packaging material for the product. Ultimately, this is about the amount of industrial knowledge that goes into the product. The higher is quotient of the application of knowledge embodied in the product, the larger is its knock-on effects on the demand for labour that it creates. This lends support to the urgency of designing and implementing capacity building programmes that empower especially product design specialists, firms, trade bodies and civil society organization with knowledge. Knowledge in this context means and includes sector-specific knowledge, product-specific knowledge and process-specific knowledge.

The amount of fixed capital that an enterprise has to work with also positively drives its need for worker. This implies that there is also a need, in the interest of spurring pro-poor growth, to increase the capital provisioning especially of MiSmall establishments. Such enhanced capital provisioning would energize their demand for labour, and would be good news for pro-poor growth.

Credit rationing may well exist in the credit markets in the designer goods industry. When the credit market is supply constrained, and that in order to obtain more credit, one needs to raise the interest rate. Capital demand function is also spurred by automation.

In order to stimulate the demand of capital by the establishments in the industry, efforts have to be made in order to lower the prevailing interest rate so that access to capital becomes more and more affordable. Clearly, public policy can help somewhat with lowering interest rates. Foremost among them is about empowering public-private partnerships (PPP) such as the Small and Medium Enterprise Foundation (SMEF) credit wholesaling programme, which is currently being planned.

Recommendations

The volume makes wide-ranging recommendations to improve the formulation of policies, capacities, competencies, 'infrastructures' and the applications of information and communications technologies in the management and dissemination of knowledge and knowledge-based public-goods inputs for advancing the common good of the producers and players of the designer goods industry of Bangladesh.

1.1 Volume's Introduction

In this volume four, we present results generated by one of the most in-depth analysis ever done of important segments of Bangladesh's designer goods industry.[3] With sustained economic growth, rising educational attainments all-around and per-capita incomes,

[3] The Bangladesh Standard Industrial Classification (BSIC) 4-digit codes that frame the ensuing discussion are presented later in this report.

growing exposure to global trends concerning what is 'fashionable' and the effects of a mass-media which is always 'on-message', the demand for all manners of designer goods is growing quite strongly. One sees a wide variety of substrates, and an equally wide assortment of raw materials, on which designers are designing and producing eye-popping apparel, artifacts, mementoes, home textiles, artificial jewellery, and personal effects.

A footprint of rapid change has stamped itself vividly on the global designer and lifestyle industry. Patrice de Place, a former senior executive at Louis Vuitton, and now a senior advisor to the elite Parisian center of excellence Mod'Art International, "The time when luxury Parisian fashion houses could impose their style at will is over. Increasingly we are selling to new countries, with new customers, and are forced to have product adaptations." For example, in a tightening luxury goods market, Louis Vuitton was able to localize handbag sales in Japan with the vibrant artistry of Takashi Murakami, networking its classic LV logo into a rainbow-coloured blossom design on white leather. Sales of the Murakami line soared to almost 10 percent of the company's worldwide revenue. De Place goes on: "I think the next ten years will be extremely interesting because China will [follow Japan's lead] and start to show what it can do in terms of luxury design" (Mod'Art Internaional, 2007).

Rapid change is also evident in the business processes being avidly used by designers. One such movement is the concept of 'Re'…reuse, recycle, recreate and rejoice (all about recycling waste). Designers increasingly stylize and display their innovative designs using industry waste such as left over cloth, ropes, newspaper, pompoms (made out of waste), ribbons, socks and bindis. Small wonder, the gross margins in this industry can be atypically high.

The rest of this volume is structured as follows. Section 4.2 introduces the economic basis of the sector. The coverage of themes here include (i) the structure of the sample of firms in terms of its composition, average employment size, the relative prominence of own-account production *versus* contract manufacturing, the levels of gross value of output versus gross value added. Section 4.3 is about some entrepreneurial success stories in the sector. Section 4.4 is about the technology setup in use in the sector, including the relative prominence of different packages and platforms of equipment and machinery in used, the relative structure of the replacement costs of the core equipment, the ensuing average physical and marginal productivities with respect to labour and number of machines. This section also estimates production functions based on the data, and uses the ensuing coefficients in tests carried out of whether returns to scale are constant or not. As well, in an important econometric exercise, the data are used in obtaining estimates of a stochastic frontier production function, and also the 'distance' of each sample observation from the estimated frontier in terms of a measure of 'efficiency', in this case gross value added. This 'distance' is also then explained using multivariate regression models so as to eventually obtain certain diagnostic insights about the drivers of efficiency in this industry. Section 4.5 takes up the state of the access-to-finance regime in the sector. Section 4.6 seeks to generate comprehensive insights about the marketing issues. Section 4.7 is about the drivers of cost levels in the sector. Section 4.8 is about the use of ICT platform in the industry, and Section 4.9 is about the management hierarchy of the sector. Section 4.10 addresses the elements of what is needed to formulate a growth strategy for the sector. This is where we estimate average annual growth rates that sample observations have had over their lives, measured in each of four different ways, and then invoke multivariate regressions models to explain inter-firm variations in growth rates.

The rest of the discussion in this section is about the impact of regulatory regime on the cash-gain prospects of the firms, from the perspectives of the latter. Section 4.11 is where we present the action plan for upgrading the capacities, competencies, ‘infrastructures’, financing arrangements and the use of information and communications technologies for advancing the common good of the producers and players in the designer goods industry.

1.2 Bangladesh’s Designer Goods Industry

1.2.1 A Broad Profile of the Sample

This prototypical report is customized to be about the designer goods industry of Bangladesh.

The designer goods industry has the following segments:
Ladies’ hand-crafted apparels;
Men’s hand-crafted apparels;
Handicrafts;
Jute decorative wares;
Cane-and-bamboo works;
Artificial jewellery making;
Designs-on-metallic surfaces industry.[4]

Table-1.1: An Overview of the Sample from the Perspective of Employment characteristics, 2007(Nos.)

Size classes	No. of firms	% of cases	Average employment per firm			Employment size per firm
			Production workers	White-collar workers	All workers	
Micro	6	4.3	0.5	6	6.5	6.5
Small	70	50	2.93	51.86	54.79	54.8
Medium	47	33.6	9.26	62.64	71.89	71.9
Large	17	12.1	15.47	651.18	666.65	666.7
MiSmall	76	59.5	2.76	48.82	51.58	51.6
MeLarge	64	45.7	10.91	218.97	229.88	229.9
All firms	140	100	6.49	126.6	133.09	133.1

Source: SMEF survey of six sectors, 2006/07

Table-1.2: An Overview of the Sample from the Perspective of Employment characteristics, 2007

Firm class Status	Average no. Of workers			Average Experience of workers		
	Male	Female	All	Male	Female	All
Micro	6.17	0.33	6.5	10.25	3.33	10.25
Small	22.69	32.76	55.44	4.78	2.17	4.4
Medium	49.53	22.36	71.89	4.45	2.77	4.14
Large	191.76	474.88	666.65	8.74	8.6	8.83
Mi small	21.38	30.2	51.58	5.22	2.26	4.87
Melarge	87.31	142.56	229.88	5.69	4.45	5.49
All	51.52	81.56	133.09	5.43	3.26	5.15

Source: SMEF survey of six sectors, 2006/07

[4] What about the so-called ‘interior design industry’? Of course, interior design is not a good but a service. At the present time, we are only interested in goods manufacturing, not as yet in services. Also, interior design has close affinity to civil engineering as a discipline, not the industrial or production engineering. This is the official reason why we didn’t include any interior design consultants among our respondents.

Table 1.3: Geographical distribution of sample establishments in the Designer Goods Industry, 2006/2007

	Frequency	Percent
Dhaka	89	63.6
Tangail	22	15.7
Chittagong	17	12.1
Rajshahi	4	2.9
Comilla	2	1.4
Gazipur	2	1.4
Rongpur	2	1.4
Khulna	1	0.7
Norshingdhi	1	0.7
Total	140	100

Source: SMEF survey of six sectors, 2006/07

1.2.2 General Introduction to the Designer Goods Industry

1.2.2.1 Scope and quality of entrepreneurial preparation of firm's creators

Successful company brands and the creation of brand loyalty typically call for entrepreneurial performance of a high caliber. According to Schumpeter, entrepreneurial performance is the defining characteristic of success in building an enterprise from the ground level up. What, however, is entrepreneurial performance, and how is one to best measure it?

Entrepreneurship is more than management, as the latter is popularly understood. Management is about managing inputs and processes, in their various aspects, that are prerequisite to satisfactorily producing the output of an establishment, based on a set of operating standards that have evolved over a period of time. Entrepreneurship is management, and then some. At times, the operating standards implicit in the routine operational procedures that amount to a best practice are bound to change suddenly and without notice for a manager/entrepreneur. A major buyer might for instance suddenly and without any notice slap upon the enterprise a binding unit price that is drastically lower. An important regional buyer has suddenly rejected a very large quantity of latest shipment of goods, causing a scramble at the headquarters of the exporter to find the root cause of the rejection. Received wisdom is of relatively little use during these periods when shocks---of one kind or the other---intervene. It is during these tumultuous times that the mettle---the entrepreneurial resilience--- of the enterprise is put to the test. How vigorously and how innovatively the enterprise will stage its response to the fuss at hand will typically depend upon how well-prepared as an entrepreneur. An entrepreneur is one who 'fills a gap' in the market-place, according to Leff (1968), thus dealing an effective solution to the absence of a complete set of markets---a frequent source of 'market failures' in economics. An entrepreneur is one who 'spots value in unlikely places and puts it to use to the point of improving his financial performance', thus hitting off with an effective improvisation in a market for 'credence goods'[5]---a frequent source of 'market failures' in economics.[6] The

[5] Credence goods are characterized by unequal distribution of gainful information, setting buyers of goods apart from sellers, and giving rise to the problem of informational asymmetry (American Economic Review, 1994).

[6] David Morawetz, in a seminal review article, informed us of how a Japanese printing entrepreneur, while visiting with an US-based entrepreneur in the same industry, spotted a block printing machine lying discarded in the former's cellar, bought it and shipped it back home, to a better financial health of his enterprise. (The US proprietor had discarded the block printing machine because, at the then higher US wage rates, the labour

question is this: what are the ideal measures of entrepreneurial preparation. We used three variables to measure entrepreneurial preparation: (i) number of years of formal schooling obtained by the entrepreneurs; (ii) whether the entrepreneur has acquired any specialized academic training that is directly connected with the running an enterprise in the industry in question; (iii) the 'degree of relevance' of the specialized training received by the entrepreneur. Tables 4.4 through 4.5 report the findings concerning the degree of the entrepreneurial preparation by the entrepreneur.

Table 1.4: Length of formal education, and the extent of the acquisition of specialized training in designer goods industry surveyed (Averages)

Firm size class	Average years since unit was set up	Average years of formal education by the entrepreneur			% with any specialized training	Average duration of such training (No. of years)
		Mean	Standard deviation	Coefficient of variation (%)		
Micro	8.32	9.72	4.35	0.45	20	0.16
Small	12.59	11.44	4.96	0.43	8.1	0.08
Medium	13.60	11.87	5.33	0.45	0	0
Large	13.54	11.92	6.41	0.53	0	0
MiSmall	11.63	11.05	4.87	0.44	12.6	0.09
MeLarge	13.57	11.89	5.74	0.48	0	0
All firms	12.02	11.22	5.04	0.45	7.9	0.08

Source: SMEF sample survey of the designer goods industry

Note: By specialized training, we mean particularized diplomas that upgrade specific vocational or industrial or technological skills in the trainees. For example, the questionnaire asked: "Did the Managing Director obtain a Masters or Diploma in Fashion Technology?" The table shows that the average MiSmall establishment was born 13.8 years ago, while the corresponding average for the MeLarge establishment was 14.9 years. The difference is not statistically significant. The average designer goods establishment was born about 14.3 years ago. Secondly, the average educational attainment of MeLarge establishment (of 11.4 years of schooling) exceeds the corresponding attainment of the MiSmall establishment by about 17.8%, and this difference between the averages is statistically significant. Finally, only about 4% overall of the managing directors on the sample have had any exposure to specialized training.

1.2.2.2 Financing start-up capital involvement: magnitude, external and internal reliance

As said already, we follow the enterprises through their life-cycles even we launch into the narrative. That is to say, we start now with the economic circumstances of their mobilization of the start-up head-count, scale of operations and, more to the point, the manner in which they had mobilized their start-up capital. The results relating to these aspects of the narrative are presented in Table-1.5 below.

productivity of the latter was not high enough. In Japan, the wages were still low enough to make the 'import' of the machine profitable). This action by the Japanese entrepreneur was an entrepreneurship *par excellence*.)

Table-1.5 : Start-up economic circumstances of the sample establishments in the Designer Goods Industry,

Firm-size	No. of start-up		Percentages of total start-up financial capital mobilized (Tk. 000s)				
	employees	machines	Equity/ Retained earning	Bank loans	Non-bank loans	Loans from friends, relatives	All debt
Micro	6.88	1.92	1586	0	0	0	28
Small	15.09	5.82	2693	167	143	112	422
Medium	20.93	24.07	4223	412	3	31	446
Large	49.23	12.85	2195	419	88	60	567
MiSmall	13.24	4.96	2578	150	131.7	103.3	385
MeLarge	34.07	18.67	3708	414	25.8	38.8	478
All	17.44	6.96	3086	269	83.3	73.8	426

Source: SMEF survey of six sectors, 2006/07

Table-1.6: Percentage of establishments reporting reliance on debt finance at start-up

Farm status	No. of firms taking at least one loan at start-up	Sample size	% of loan takers in the size-class	No. of firms that had no loans at start-up	% of cases in the size-class
Micro	1	6	16.67	5	83.3
Small	29	76	41.43	47	58.57
Medium	19	47	40.43	28	59.57
Large	7	17	41.18	10	58.82
Mi small	30	76	39.47	46	60.53
Melarge	26	64	40.63	38	59.37
All	56	140	40	84	60.0

Source: SMEF survey of six sectors, 2006/07

The table shows that while the MiSmall establishments in the designer goods industry report an average start-up headcount of 13.24 in the start-up year, the corresponding headcount for the MeLarge establishments in this designer goods industry happens to be 34.07. Whereas the representative MiSmall establishment in the designer goods industry reports an average number of machines of 4.96, the corresponding number for the MeLarge establishments in this sector happens to be 18.67. Likewise, whereas the representative MiSmall establishment in this industry report an average start-up equity of Tk. 1209 thousands, the corresponding equity for the MeLarge establishments in this sector happens to Tk. 2366 thousands.[7], [8] Likewise, whereas the representative MiSmall establishment in this industry report an average start-up debt of Tk. 119.8 thousand, the corresponding debt for the MeLarge establishments in this sector happens to Tk. 219.3 thousands. On an average, the debt-equity ratio at start-up of the four categories of firms in the Table 1.5 are, respectively, 0:100, 14:86,10:90 and 20:80.

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[7] Equity in our formulation includes retained earnings, including from other businesses wholly or partially owned by the entrepreneur in question.

[8] The establishments whether within the MiSmall or MeLarge categories start up in different years. Strictly speaking, it is not legitimate to group for purposes of calculating an average for them. That said, one of the reasons why we still group them is that we want to calculate how much of growth the establishments have had since their start-up. We group them once again for purposes of calculating an average level of equity they have in the study year, namely, 2006-2007.

Equity including retained earning happens to be source of start-up capital of choice among the entrepreneurs in this industry. Use of, or access to debt, seems, strictly, to be a minority in this industry. This reliance on equity including retained earning especially by the micro, small and medium establishments in this industry as shown above also happens to be the general characteristic of the small and medium enterprises in Bangladesh in the general case as well.

1.2.2.3 Principal products and bye-products

Table-1.7 is about the relative prominence of establishments with different business models, and about the number of main products which are produced by the establishments. As well, we distinguish between two major categories of establishments, namely, (i) those who rely solely on *own-account production*, and (ii) those who rely solely on *contract manufacturing*.

1.2.2.4 Business model differences: own-account producers *versus* contract manufacturers

We mainly recognize two business models, namely, own-account producers, contract-manufacturers and others. Own-account producers are those who implement each of the stages of the life-cycle of being a manufacturer: designing products, calculating addressable markets and the size of production batches, buying raw materials, accessing finance, setting the price, and being responsible for marketing what is produced. If (s)he can do all of the above efficiently, minimizing his costs and maximizing his sales, (s)he will be in the black, and make money. The distinguishing characteristic of this business model is that the entrepreneur takes all the risks and pockets all the difference between the revenue and his costs. By comparison, contract manufacturing is a competing business model in which the manufacturer essentially works as an agent of a third party. The latter issues to the former the specifications of the products and the quality standards (eg the percentage of rejects in the output consistent with satisfactory delivery, etc.), and pays him a manufacturing charge for what (s)he manufactures: the CM has to buy up the needed supplies of raw materials and accessories. A variation on the above theme is that the third party procures the essential raw materials and supplies them to the contract manufacturers' (CM's) premises, and agrees to buy up to an agreed overall quantity subject to the CM passes muster in terms of the quality standards. In this case, of course the third party sets a different, and lower, price. But even so, the CM does not have to worry about buying supplies and taking the risks of marketing the product. The acid test of profitability for the CM is only that he correctly works out whether his unit cost of manufacturing subject to the third party's leaves him a positive margin of cash-gains. Besides these two dominant types, there is the largely residual, 'third', type we call 'others'. This type comprises of establishments with dual-mode business models, such as when an own-account producer doubles up as a part-time trader of items similar to those that he also manufactures.

Table-1.7: Differences in specialization: own-account production versus contract manufacturing in Designer Goods Industry, 2007

Firm Size class	Proportion of establishments that are in				Average no. of products
	own account production	Contract manufacturing	Others	All establishments	
Micro	5.0	0.71	0	5.71	2.75
Small	21.4	25	2.14	48.54	3.43
Medium	10.71	22.14	0.71	33.56	3.7
Large	10	2.14	0	12.14	4.76
Mismall	26.43	25.71	2.14	54.28	3.36
Melarge	20.71	24.29	0.71	45.71	3.98
All	47.14	50	2.86	100	3.64

Source: SMEF survey of six sectors, 2006/07

The table informs us that contract manufacturing and out-sourcing comprise the single most important type of business models prevalent in the designer goods industry of Bangladesh. A clean 50% of all the establishments on our sample are found to be based on this model, whereas another 47%, overall, of the establishments are found to be working per the own-account production model. Close to 3% of the sample establishments belong in the 'other' type. Secondly, we note that while the MiSmall establishments are within a spitting distance from the MeLarge establishments in terms of the respective proportions of CMs in their total numbers, there is a difference of almost six percentage points between the two classes of establishments when it comes to the percentage of own-account producers, with the balance being with the MiSmall establishments. The last column informs us that the average number of products manufactured by the establishments in the size-classes (ie, micro, small, medium and large) is 3.64.

The manufacturing interests surveyed by us belong to four major categories, namely, apparel that are custom-designed and –produced by handlooms. The products of these businesses include ladies' *shalwar-kameez-orrna* (three-in-one pieces), *sarees* (ladies lower dresses), mens' *fatua* (upper dresses made typically from cotton fabrics and worn informally), men's tunic (again upper dresses which drop almost to the knees and which are mostly worn on informal occasions), men's shirt. The second important category is household textiles. That is to say, this output consists of bed sheets, bed covers, pillow covers, sofa covers, and the like. The third subcomponent of the designer goods industry consists of large decorative pieces of confection, such as *nakshikantha*, and the like.

The output-mix of the sample establishments in the designer goods industry is in fact quite diverse, embodying several different features, functionalities, specifications, weight-length ratio, and the like. Sarees come along with a maze of different 'constructions',[9] colours, and design specifics. Likewise, ladies' 3-in-1's are typically a rich ensemble of colors, intricate embroidered effects, embedded *karchoopies*, and several other artifacts.[10], [11] Variety is the name of the game in the designer goods industry and, indeed, in any other industry. Hence we have 'chained' heterogeneous streams of output produced by the sample establishments using the only parity that is available to man under the circumstances prevailing, namely, price relatives prevailing between them.[12]

[9] In the jargon of textiles industry, a 'construction' comprises width times length, and warm times weft. Width of the fabric is measured in inches. Length is measured in yards. Warp refers to the number of yarns per inch of what is called the *tana*. The weft refers to the number of yarns ending per inch along the width. The more the number of yarn per inch along the width and the *tana*, the stronger is the *bain* or the texture of the resulting fabric. The wider and the longer the saree, the more would it cost to produce. Therefore, the average costs would depend upon a fairly large set of parameters. The numbers presented in the foregoing are mere averages over all those different constructions, and design specifications.

[10] The unit value of such variegated confections will naturally depend not only upon the quantity of raw materials and the exquisiteness of workmanship performed on each piece of artistry, but also on whether the work has a potential of setting a fashion trend in the industry. The fact is therefore that a lot of variables play into the determining of the average cost of production of any given product churned out by the designer goods industry. A wide range of values must be conceived to be in the backdrop.

[11] Likewise, the product range of the electrical and electronics industry is staggeringly heterogeneous, with the uninterrupted power supply (UPS) and the instant power supply (IPS) that it makes coming off in hundreds of versions of specifications, measurements, capacities, input-output range, and the like.

[12] This is a standard practice. Price relatives relating to two goods, one of which happens to be the 'benchmark', and the other comparator, are first calculated. Given the assumption of perfect competition prevailing between those two goods, the price relative between the goods is the closest that one can come to grasping the rate of transformation between them. That rate provides a way of expressing the comparator good in terms of the benchmark good. This was done both for the output(s), as also then for the input(s).

Table-1.8 reports physical scale of output per establishment and the value of gross output of the sample establishments arrayed in order of their size, ranging from micro to large sizes.[13] At this stage, it will only be in order to take cognizance of the mosaic represented by the results about the various average based on various ways of slicing and dicing the data. We should probably not wish to find well-defined patterns in the results. Several findings each rates a citation.

First, for OAPs, physical output per establishment for the MiSmall and MeLarge establishments are, respectively, 3268.4 and 8545.1. For all OAPs, the physical output per establishment is found to be 5586.98 unit. By comparison, the average scales of output for the CMs are typically higher, sometimes significantly higher. Thus, output per establishment for the MiSmall and MeLarge CM establishments are, respectively, 3822.0 and 17925.9 units. Both sets of mean differences setting MiSmall apart from MeLarge establishments are statistically significant.

Secondly, average gross output per establishment for the MeLarge class for the OAPs is Tk. 18448.12 thousands compared with Tk. 6064.10 for the MiSmall class---in other words, is more than 3 times as large.

The average scale of output per establishments for the CMs of the MeLarge class, at 17925.9 units, is more than four times as large compared with the MiSmall establishments. Average gross output per establishment for the MeLarge class for the CMs is Tk. 202843.0 thousands compared with Tk. 7828.2 for the MiSmall class---in other words, is more than almost 26 times as large. The upshot is that average unit-values[14] of the products of the MiSmall category of establishments are significantly lower compared with MeLarge establishments.

[13] Physical scale of output refers to annual rate of the firms' production in physical units (how this was obtained is explained later.) In this report, 'gross value of output' is the same thing as 'annual sales revenue' or simply 'revenue'.

[14] For uni-product establishments, average price of product is a clear cut concept: this relates to what on average has the product of the establishment sold for. Matter are much less clear-cut when firms typically produce or custom-make between three and four different products, each replete with its own unit of measurement, level of technological complexity, the end-user it is supposed to cater to, and the input-intensities that characterize them. Here, unit values of different product will differ. Typically, different products will be 'chained' including by using a kind of method that we used, meaning one method that is based on using price relatives for the different products and thus 'converting' quantities of each of the 'comparator' products into units of a 'benchmark' or 'dominant' product segment. In this case, we get what we call average unit values across all different physical outputs of the establishments in question. That is why we are using the term average unit values.

Table-1.8: Differences in scales of output between own-account productions versus contract manufacturing in Designer goods industry, 2007

Firm size classes	Average scale of output per unit engaged in physical units			Gross value of output per establishment (Tk 000s)			
	Own-account production	Contract manufac-ture	Others	Own account producers	Contract manufacturers	Others	All
Micro	941.6	4000	0	4707	7500	0	4324
Small	3811.36	3816.95	4833.11	5694	8540	21435	7339
Medium	4830.1	12918.69	5184	20605	20685	19900	20589
Large	12525.52	69666.67	0	51328	465000	0	73912
MiSmall	3268.43	3822.04	4833.11	5507	8511	21435	7101
MeLarge	8545.13	17925.86	5184	35437	59889	19900	34132
All firms	5586.98	10672.47	4720.83	18658	33466	21179	19352

Source: Six Sector Studies Survey, 2006/07

Results relating to average unit-values of output per establishment of the sample establishments arrayed in order of their size, ranging from micro to large sizes have been calculated but not presented in order to reduce clutter caused when a large number of tables are presented in a report. There occasionally are marked differences, within both the OAP and CM classes. Thus for instance for the OAPs, while the average unit-values for the micro, medium and large classes are relatively closely strung around a value of around 4000, the small establishment 'disturb' this relative cohesion by positing an average value of 1493.9. That said, one could also argue that while cohesive stringing of values of output across various sizes may represent a herding behavior, a discordant behavior, such as by the small size class of firm in the table above may well represent innovative behavior. It is the right of entrepreneurs in each class to put together their business plan and implement them as they see fit, whether such implementation might magnify or mitigate what to a statistician may represent concordance or discordance. We are presenting exactly what is in the data: that is our mandate. We see a similar pattern for the CMs too. While the average unit-values for the micro, small and medium classes are relatively closely strung around a value of around 2000, the large establishment class 'disturbs' this relative cohesion by positing an average value of 6674.6. [15]

Table 1.9: Average gross value added by different types of establishments, 2006/2007

Firm size classes	gross value added per establishment, across three types (Tk. 000s)			
	Own-account producers	Contract manufacturers	Others	All
Micro	3496	6117	0	3204.3
Small	2805.6	5585	4695.5	4362.0
Medium	10069.9	13451.6	5396	9639.2
Large	29999	292498	0	107499
MiSmall	2936	5600.8	4695.5	4410.8
MeLarge	19690.7	38073	5396	21053
All firms	10298	21372.8	4870.6	12180

Source: SMEF survey of six sectors, 2006/07

[15] Empirical results about average unit values of output produced across firm size classes are available with the author.

Table 1.10:

Firm size classes	Gross value added relative to Value of gross output, per establishment, across three types of establishments			
	Own-account producers	**Contract manufacturers**	**Others**	**All**
Micro	74.27	81.56	0	74.1
Small	49.29	65.4	21.9	59.4
Medium	48.87	65.0	27.1	46.8
Large	58.45	62.9	0	60.0
MiSmall	53.31	65.8	21.9	62.1
MeLarge	55.57	63.57	27.1	61.7
All firms	55.19	63.86	23.0	62.9

Source: SMEF survey of six sectors, 2006/07

1.2.2.5 The Accuracy of Results from the surveys conducted for six sector studies

The objective of this subsection is to demonstrate, if only in passing, how the cryatallization of a knowledge base can enhance the exercise of policy-making. We first show some important results relating to micro, small, medium and large establishments are presented in the following tables (2.1 and 2.2), based on data generated by two large-scale sample surveys of the SME sector carried out in Bangladesh during the last six years or so. The first source is the World Bank's Investment Climate Survey 2002. The second source is the in-depth surveys associated with six sectors, commissioned by the SME Foundation in 2008.[16] Results from the two surveys are presented having the same format, in the interest of ready comparability. We then include some diagnostic results from a stochastic frontier production function for highlighting how certain behavioural variables, measured at firm level, can explain firms' distance from estimated efficiency or production frontiers (Table 2.3). We include these results because we also wish to be able to do similar econometrically appropriate diagnostic analyses with the data that this implementation would enable one to generate.

Table-1.11: Economic characteristics of micro, small, medium and large firms, 2002
(Unless otherwise indicated, financial values are in Tk. 000s)

Particulars	Micro	Small	MiSmall	Medium	Large
Sample size	34	195	229	127	621
Total sales	22177	28012.2	27145	75000.2	289013
Direct material cost	13033	18631.5	17800	51393.7	152994
Value added	9144	9380.6	9345	23606.4	136019
No. of workers	5.47	28.27	24.89	68.4	415.2
Labour productivity	1671.6	168.8	375.45	345.12	327.6
Capital employed	11879.8	25078	23118.6	120930	250283
Capital-output ratio (Tk.)	1.29	2.67	2.47	5.122	1.84

Source: Investment Climate Survey (ICS) data, 2002

Note: Sample size of the source is 977 establishments interviewed by Bangladesh Enterprise Institute (BEI) in 2002.

[16] The sector team leaders of the second study are Naeem Chowdhury, Momtaz Uddin Ahmed, K. Siddique-e-Rabbani, M. Kamal Uddin, Saleh Ahmed and M. Burhan Uddin. The overall team was led by Naeem Chowdhury, the team leader of the present implementation.

Table 1.12: Results from the six sector studies surveys commissioned by the SME Foundation

(All numbers, unless said to the contrary, are measured in Tk. 000s)

Particulars	Micro	Small	MiSmall	Medium	Large	MeLarge
Sample size	83	378	461	212	103	234
Total sales	6014.9	27250.7	23427.3	69975.6	338294.0	204915.7
Direct material cost	2497.5	15606.1	13245.9	39794.8	163217.8	103032.6
Value added	2445.9	8476.6	7390.9	29054.6	168406.2	97979.5
No. of workers	6.3	23.6	20.5	47.3	329.5	175.8
Labour productivity	385.3	358.4	359.9	613.9	511.1	557.2
Capital employed	2331.7	9777.8	8437.2	70140.4	135091.6	116735.2
Capital-output ratio (Tk.)	1.27	1.08	1.09	1.67	1.42	1.22

Source: SMEF survey of six sectors, 2006/07

Note: These are results compiled from six reports recently prepared for the SME Foundation. The International Economic Statistician/Team Leader of the present Maxwell Stamp Limited team was also the Team Leader of the said SME Foundation. Between the six sectors, 846 manufacturing establishments were surveyed and interviewed in very considerable depth. The sectors are (a) agro & food processing; (b) designer goods industry; (c) electricals and electronics; (d) leather & footwear; (e) light engineering and (f) plastics. The averages are all weighted averages.

Several similarities between the two sets of results are notable, as follows:

(1) Value added as a percentage of sales for the MiSmall class of establishments is found to be 31.5%. For the ICS-2002, this is found to be 34.4%. Considering that Bangladesh economy has become even more outward-oriented during the six intervening years since 2002, thereby increasing competitive pressure on the domestic manufacturers. That assessment is consistent with the take of value added's relative share in sales having fallen between 2002 and 2007. In contrast, for the large enterprises, value added relative to sales is found to have risen between 2002 and 2007---from 47.1% to 49.7. Even so, the percentages yielded by the two surveys are strikingly similar. The point is that both survey samples seem to have been drawn from the same universe.

(2) Labor productivity (in thousand Taka worth of value added per worker employed) is found to be Tk. 375.45 thousands in 2002 as compared with Tk. 359.9 thousands in 2006/7. That is a striking similarity. Value added per worker is one of the most central empirical metrics when it comes to pro-poor development.

(3) Both surveys show that the MiSmall establishments register significantly higher capital productivity---by returning lower or much lower capital-output ratios on an average compared with medium or large firms.

It is reassuring that the more recent 2006/2007 survey, which has a somewhat smaller sample size than the ICS-2002, yields results that are often very similar compared with the latter. This is because, on a close examination, it was found that there is a close correspondence, for example, between the average enterprise employment size across the firm-size structure reported by the BEI survey, compared with the findings from the Economic Census, 2001/2003, conducted by the Bangladesh Bureau of Statistics (BBS). BBS reported an average employment size of 66.7 in 2001/2003 for medium enterprises, whereas the ICS data put that average at 68.4--- a statistically insignificant difference indeed (Chowdhury, 2007b). The BBS reported an average employment size of 389 in 2001/2003 for large enterprises, whereas the ICS data put that average at 415--- a difference of 4 or 5 percent, which is small. The quality of data in the 2006/2007 surveys of the six sectors appears to be representative of the same 'universe' as the ICS-2002.

1.2.2.6 Presenting a baseline for the designer goods sector

By blowing up from our sample estimates to the level of the relevant statistical universe, we obtain a kind of baseline data for the sector. We blow up by multiplying sample average value added by the number of establishments in the entire economy. Before proceeding any further, we need to briefly describe how we arrive at the number of establishments in this industry in the economy overall, and the problems that attach thereto for the purposes of this particular blow-up exercise.

The BR-2007 gives the number of establishments in small, medium and large size classes in the entire economy. But it does not do the same for the micro firms. The Economic Census 2001/2003 does that. We use compound annual growth rate for small firms between 2001/3 and 2007 --- a passage of some five years --- as the basis for extrapolating the number of the micro firms overall in this industry. Those numbers are then presented in Table 1.13. We find that the designer goods industry is about the size of Tk. 29 billion in 2006/07 .

Table-1.13: Bangladesh's designer goods industry, 2006/2007: the first estimate

Firm size classes	Gross value added per unit (Tk. 000s)				Number of establishments in Bangladesh (No)	Grossed up value of value added ((Tk. billion))
	Own-account production	Contract manufac-ture	Others	All		
Micro	3495.9	6117	0	3823.54	1360	5.2
Small	3792.15	4812.84	5250.9	4319.64	789	3.4
Medium	8759.07	14887.02	17328.0	12200.9	583	7.1
Large	17979.09	216345.62	0	76322.2	174	13.28
Total					2906	28.9

Source: Six Sector Studies Survey, 2006/07

1.3 Enterprise-cum-entrepreneurial profile of the designer goods industry

By incumbents, we mean prominent leaders of the industry in question. That said, however, the Team had proposed that only about 12 or so large establishments in the designer goods industry would be surveyed. (And the SMEF had concurred with this proposal.) The presentation of the incumbents in the following would therefore be confined to five or six among the most prominent of the establishments surveyed, including several of the largest of the establishments surveyed. The presentation would largely be cast in terms of the business development capabilities of these incumbents. We shall single out only one business development capability. That capability essentially comes in essentially three flavours. First is the development capability of ensuring growth of the employment size. The second is the development capability of ensuring growth of retained earning. The third is the development of capability of ensuring growth of sales. With this in mind, we present five case studies of entrepreneurial 'movers-and-shakers' of the designer goods industry industry of Bangladesh.[17]

[17] It is in the best tradition of empirical research that these profiles will be anonymous, and that no names will be named. The names of the entrepreneurs to be used will be fictitious. And, yet we want to confirm that each of these five case studies are the whole truth, and nothing but the truth.

Case 1: A clothing apprentice to a leading design cast in the designer industry

The first case study in the designer goods industry industry is a man who is about 45 years of age. Whereas he started his working life around 1986 as an apprentice in Dhaka, having firs had his roots in the middle-central part of Bangladesh. He went the ‘learning curve’ of the life of a *master tailor* in the Old Dhaka, and soon felt confident enough to set up his own ‘production house’, investing his own money. Initially, he committed relatively small amounts of money sourced from his own meager savings. His net worth grew. He felt more bullish over time. Eventually, he persuaded his father to dispose of a significant part of what remained of the latter’s landed inheritance, raising Tk. 130,000 in 1988-89. He invested this money in his design-cum-production business. Still a rookie businessman, little did he know about the treacherous undercurrents and murderous whirlpools of ‘trade credit’. Before he realized, he had lent to ‘hungry’ itinerant merchants about two hundred thousands, including the Tk. 130000 sourced from the sale of a precious piece of land. Then came the floods of 1988, and his ‘receivables’ vapourized into thin air, as his trade borrowers defaulted peremptorily. The magnitude of the loss caused him and his family to stagger, quickly making him an abomination at his home in the village. Gradually, it became difficult for him to continue to live in Dhaka, where he was seen by friends and colleagues as a “walking disaster”.

In 1989, he left for Chittagong. The idea was both about changing his ‘environment’, and upgrading his skills as a “designer”. He had found a real master of the crafts in Chittagong. However, this was a fastidious master, with a fast mouth that would hurl expletives at high speed at the flimsiest pretext. But a master of the crafts he really was. Ever the hungry disciple, our hero stuck to him tenaciously through thick and thin, and brought out of this master the very best in him. After a year’s grueling apprenticeship, Abul’s repertory of skills and ‘tricks’ burgeoned. Ever the prescient learner, he realized that to really do well in the designer goods industry, one had to be versatile. He therefore switched his job, purposively seeking out yet another boutique which specialized in a different kind of stuff. Thus, over a three-year stint, he worked for, and plumbed the depths of the repertoire of, three different maestros. Finding him to be both talented and trustworthy, the last of these three bosses left the entire business---design, production and marketing--- in Abul’s hands, thus handing him a rare opportunity to plumb the depths of each of the three facets of the business in the design industry. Having come, seen and conquered Chittagong, it was in 1993 he felt that time had again come for him to return to Dhaka, the “gleaming lights” of the world of fashion and design which had so cruelly and unceremoniously ‘trashed’ him in 1988.

Once in Dhaka, he had to establish his credentials, and do hard yards. When he approached a wily mandarin of the design industry for business, the latter threw down the gauntlet, and wrote him a ‘challenge test’. Four designs, peeled from a brochure of Indian designs, comprised the test, and Abul has a deadline of three days in which to comply. He passed this test with room to spare. That is how begun a business relationship that extended for a full six years between Abul and this wily character. The latter made a production advance worth Tk. 200000, against which Abul started to design and produce.

It was during this period of six years that Abul working as a designer attached to an aggregator based in Islampur, the so-called Manchester of Bangladesh, established himself as a highly creative designer. He produced myriad designs that were smashing hits. Over a six-year period, he rented space, hiring at it peak a total headcount of sixty workers. He also made enough money to buy his father more land than he had been the root cause of the loss of a decade ago. The nagging issue however was that he was not necessarily building his own brand---the ultimate holy grail of a designer/producer---but that he was the prime-mover of the building of a brand for someone else. This stoked a fault-line between him and his patron, gradually leading to an erosion of the bonding between the two of them. The relationship between the proprietor of Shiton Garments and Abul began to cool off. The relationship broke off in 1999. Abul then downsized his operations so that he would not require a whole lot of capital. He started afresh, designing, producing for and peddling his own brand. Beginning with some 15 workers in 1999, today Abul employs more than 50 workers including six designers, including 2 fabric designers and 3 fashion designers. Now his annual revenue is in the region of Tk. 15 million on his own admission, with a gross margin of some 35% or so. Since about 2002/3, Abul has been visiting Europe and North America, networking for business and germinating sales leads. He has already had some success in the United States, having exported wares worth some US $ 20000 in 2008.

Abul says that the capacity of the input supply chain for design sector work in Bangladesh has been growing like bounding gazelles. Time was that customers in rich countries typically held their noses up at the very mention of Bangladesh. And there were legitimate reasons for such poor publicity: Bangladesh's fabrics' colours were fading, the yarn was not sufficiently fine, edges remained attached to the fabrics, and so on. With import liberalization becoming effective, commercial importers have diligently introduced variety, durability, finesse, timeliness and parsimony into their own businesses. Fastness of color in print jobs has thus resulted, as has an improvement in the capacity of the designer to produce authentic knock-offs based on head-turning, at times Indian, original designs. The designer industry has also become more and more adept at shopping for and retaining the services of high-impact foreign designers and then at transferring their intellectual property into indigenous capability systems.

Case 2: From a home-tutor to an design goods industry icon: a second case study

Our second case study was a young arts student hailing from a hard-scrabble home in the south of Bangladesh, trying to study fine arts as well as keep body and soul together. His father or family being utterly hard-up to help meaningfully, our study had to make to ends meet by doubling up as a home-tutor, offering lessons on fine arts and panting. This was in the early 1990s. He completed his fine arts studies around 1996. First off, he started to make a living by selling his paintings. There wasn't really a market for art works to speak of , especially of work done by rookie painters. Facing privation, and being hounded by creditors chasing him for repayment arising from student loans, he faced a difficult time at the face. A friend who had prospered in the designer goods industry talked him into the first hesitant steps into designer goods entrepreneurship. Possessed of an uncanny penchant for writing intricate, lively but joyous imagery, comprising fauna, flora and flowers and the like, he soon made his mark through his work. More and more orders followed in the wake of his early success. Initially, he worked as consultant to production houses, creating designs and remunerating himself based on the sales proceeds from his creation. Then, around the year 2000, he set up shop himself, opening his own fashion designer boutique. He has not since looked back.

Case 3: A playful 'conman' to a leading entrepreneur in the designer industry

This young man who runs this company had a knack for making 'a quick buck' in his genes. From his early boyhood, it was his habit to hang out with other friends especially in their families' shops in a major city of Bangladesh. It would happen that a walk-in customer would come in and ask about a certain product. It would also happen that this young man would happen to know that the good that this customer desires is available at yet another store that belongs to yet another friend. He would call the latter rightaway, and ask about the price. He would top what his friend from the end of the line had demanded up with a percentage. Then he would holler, right within the earshot of the 'sacrificial goat' (ie the customer) the 'new' higher price and would ask: "So you're telling me that this article can be had at this price right? Okay. I am coming to fetch it for this gentleman who is standing right here". Then he would run to his friend's, collect the article, pay his friend off and himself pocket the difference. He had made himself a quick buck without working up a sweat.

Sometime in the mid-1980s, he, along with a sister of his, entered into the designer goods business. Those days, designer goods pretty much meant working with weavers in Tangail area, conjuring up attractive designs to be woven up on handlooms, and then piling the ensuing products on to the hungry Dhaka markets. Eid and durga-puja festivities were eagerly looked forward to as hot seasons.
That young man and his sister have consistently grown. And today, they have a couple of show-rooms and scores of employees. Their turnover has grown tidily, if not spectacularly. That young man, who didn't even complete an university education, is a multimillionaire.

Case 4: A young lady with ambition and a strong aesthetics becoming a very successful exporter of decorative handicrafts

Our heroine is a petite Bangladeshi lady with no more than an university education with a f-years' degree to her credit. After obtaining her Masters, she tried the odd job or two, first at an advertising firm, then with a rights group. Innately creative and occupationally restless, she was getting more and more agitated as her search for where she wanted her career to be, when she was invited by a family friend to an exhibition in Calcutta displaying handicrafts. The invitation did not instantly pique her interest. But the invitee had a special corner in her heart. She obliged and, plonking down quite a bit of money she still didn't have bucketful of, she paid the air-fare. This was in the early 1990s. Her expose to the exhibits of the fair bowled her over. She witnessed a bewitching emsemble of crafts, scarfs, hankerchiefs, mats, and what have you. These wares used as substrates the gamut of dirt-cheap materials such as bamboo peels, bamboos, straw, hay, wood-scraps, clay, and all manners of dregs and dredges. Even to her uninitiated eyes, these wares glared and flared as a way of packaging dregs into objects of arts that fetched the top dollar. The ambitious woman that she was, she was instantly hooked. She set about thinking.

Returning to Dhaka, she started quit her day job, and, taking a deep breath, took the plunge into creating, from the ground up, a handicrafts company. The early days were challenging indeed. Mistakes made, both by her, and by fledgling staff, were galore. The production of handicrafts is a nuanced exercise, which requires, for success, insights about which ensemble of colors, forms, patterns, designs and shtick would become a winning combination. It requires an introspective analytical ability to divine the trends concerning the migration of tastes. It requires an uncanny grasp of what is 'hip' and what is 'flat'. This young lady had both innate abilities in ample measure.

Today, she is the managing director of a major handicrafts boutiques, and exports her riveting products to more than 30 countries. From very humble beginnings, she now goes to more than 10-12 international exhibitions a year. She is a very vocal advocate of the concept that Bangladesh ought to take the leadership to organize international handicrafts fairs in

Dhaka and Chittagong more frequently. She ardently believes that these fairs are incredibly fertile crucibles where mere observations of what is on display, albeit through the trained eyes of Bangladesh's tens of thousands of rural handicraft producers, can eventually act like 'killer' catalysts.

It was about fifteen years ago that she started her handicrafts firm. Today, she is one of the most prolific exporters. Her annual turnover belies her diminutive stature. Her gross margin is a stunner. Her growth since the start-up year is makes one's eye pop out. She is Bangladesh's equivalent of China's paper queen, Ms. Cheung Yueng, the richest self-made woman in the world.

Case 5: An fledgling apprentice to a leading icon in the designer goods industry

This is once again the story of one woman. Of about 55 years of age, and coming from a traditional Muslim family hailing from the Old City, she didn't have any opportunity to acquire advanced university education: early marriage, soon after she had obtained her bachelors degree forced her into home-making. But she wasn't the home-making type. Soon, she had stumbled upon a career path of her own.

From her traditional mother, she had developed the ability of dress-making, crocheting, embroidering, hemming, and the like. She used to go to New Market before Eid festivities, and she would stagger at the crush of people, especially women, who were braving sizzling heat and dripping perspiration to buy designer dresses for their loved ones coughing up the top dollar. More than the shopping, she used to be there to feel in her veins the feverish, almost addictive, craze that women brought to these shopping errands of theirs. Slowly and steadily, a vision, a plan, began to crystallize in her mind. In the end, this embryonic vision spawned one of Dhaka's now most renowned designer boutique. When she got started, she had one competitor already started up.

The early going was by no means a walk in the park. It was fiendishly difficult to raise money. It was even more difficult to sell on any scale, as Dhaka's middle class had not as yet began to 'show up'. Gradually, the economic muscle of the middle class started to flex themselves, as real estate market began to do the heavy lifting, as incomes from the newly-minted RMG-owning families began to percolate to the urban shopping malls, as women more and more often began to hit their strides among the professions and the ranks of white-collar workers. With urban incomes growing, with 'cultural nationality' becoming a more and more prominent totem of lifestyle choices, *bangla seasons* took on defining characteristics of what is hip and what is not. Thus, the *pohela baisakh* and *pohela falguna* became the leitmotif of the formation of new styles, new goods, new veins in the mosaic of demand that beckoned the vendors. Gradually, demand began to grow strongly. Our heroine consistently did well financially. She also ventured abroad, into India, the Middle East, Europe and the US. Commercial success has blessed her efforts. For about two months in a year, she is abroad on business. Her mobile has 'roaming' always turned on. She is one of the undisputed leaders of the designer goods industry today. She has bought several luxury apartments in upscale areas of the city, and she almost personifies the vibes of growth, success and innovation that are the hallmarks of the designer goods industry of Bangladesh.

Case 5: A clothing apprentice to a leading design cast in the designer industry

1.4 Technology Platform in Use in Designer Goods Industry

1.4.1 The technology platform in use

By technology platform, we generally mean the production techniques in use, the factor proportions prevalent in these vertical industrial sectors, bearing in mind that we shall need to use an acceptable definition of technology.

1.4.2 Technological and Quality Upgrading

Technological capability is a competitive differentiator of critical importance. This is especially true when the world of production and competition is a global village. China and India, especially China, is not just attracting very large dollops of foreign direct investment but also large and medium multinational companies who are eagerly transferring proprietary technologies to China and then training up the Chinese in using sometimes quite advanced technologies. That has raised the bar quite significantly for the competition, including what is a potential competition with a "long-shot" such as Bangladesh. This is why technological upgrading is exhibit number 1 when it comes to "binding constraint". This is no longer a time for banal platitudes, of the kind that many government and donor pronouncements are made of. Nothing short of a very determined effort to draw level with, sometimes even leap-frog, a deadly serious competition is called for.

Technology embraces (i) manufacturing process; (ii) product functionality, durability and user convenience; (iii) product aesthetics; and finally (iv) the aesthetics and environmental dimensions of product packaging. Technology can-do that makes a difference thus is a versatile and challenging package. Stanford University technology historian Professor Nathan Rosenberg called science *papyrocentric*, something that loves publicity, but technology *papyrophobic*, something that loves anonymity. Profitable technology demands diligent digging and is inherently costly, because it is largely proprietary. The market for proprietary resources is always prone to imperfections, either because sellers have an insurmountable informational advantage, or because demand, discouraged by high prices characteristic of low initial volume, never picks up: a case of information asymmetry again. Asymmetries in access to credit markets --- another permanent fixture of under-development --- compounds the first problem. Plugging the competitive technological gap afflicting especially small enterprises will require accent on (i) attracting foreign direct investment (FDI) of the right kind; (ii) negotiation of minimalist "local-content" guarantees through the Board of Investment; (iii) scoping, and providing seed-money for, applied R & D under the aegis of the SME Foundation and the DCCI, for instance; (iv) determining requirements and funding for creating and/or augmenting the infrastructure of R & D, to name the four that come to the mind instantly. All of that will put a premium on deliberate, resolute and informed public interventions, including public-private partnerships, all executed cost-effectively and flawlessly. No doubt, in discharging that mandate, catalysts and providers will all require building of their own capacities, for conception, discovery and implementation. Above all, political will, at all levels of governance --- within the government, in the civil-society organizations, in the private sector---will need to be stirred, marshaled and then aimed at this binding constraint. Technical universities, research institutions, training institutions will be better equipped and empowered to strengthen their R&D profiles from the perspectives of potential private sector adopters. The SME Web Portal will be leveraged up to the hilt for this end. Institutional reforms in terms of sharing the risks and returns to innovation between the private, often young, inventors/innovators and civil-society organizations, using market-friendly trade-off schemes will need to be experimented and then gradually brought into the mainstream.

1.4.3 Production technique in use in the Designer Goods industry

Table-1.14 shows the variety of production techniques in use in the industry. As well, it shows the average number of machines of various kind that are employed in the designer goods industry of Bangladesh.

Table-1.14: The diversity implicit in the technology platform in the Designer Goods Industry

(No. of machines/equipment per establishment)

Size class groups	Average number of machines per establishment							
	Embroidering Machine (automated)	Embroidering Machine (manual)	Sewing Machine	Karchupi frame	Spray machine	Specialized Handlooms	Others	All
Micro	4	0.0	4	4	0.0	7.4	0.0	19.4
Small	2.83	3.18	4.07	8.43	0.4	24.42	1.86	45.2
Medium	5.61	4.9	12.46	31.8	1.5	36.33	37.43	130.0
Large	13.4	26	31.71	30	4.5	63.57	11.5	180.7
Mismall	2.87	3.18	4.06	7.88	0.4	19.41	1.86	39.66
Melarge	6.79	13.59	19.2	31.28	3	55.4	31.67	160.9
All	4.69	9.5	12.47	18.8	1.56	32.74	18.62	98.4

Source: SMEF Survey, 2008

Note: The numbers in the foregoing table are based only on the number of 'core' machines, both those bought new or in used condition. The number of auxiliary tools and devices has not been included in this calculation.

The manufacturing establishments in this industry essentially belong to five major categories, namely, (i) embroiderers/denim (BSIC 1813); (ii) saree (BSIC 1716); (iii) ladies' and mens' designer apparel (BSIC 1811); (iv) knitwear; and (v) others[18]. The products of these businesses include ladies' *shalwar-kameez-orrna* (three-in-one pieces), *sarees* (ladies lower dresses), mens' *fatua* (upper dresses made typically from cotton fabrics and worn informally), men's tunic (again upper dresses which drop almost to the knees and which are mostly worn on informal occasions), and men's shirt. The second important category is household textiles. That is to say, this output consists of bed sheets, bed covers, pillow covers, sofa covers, and the like. The third subcomponent of the designer goods industry consists of large decorative pieces of confection, such as *nakshikantha*, and the like.
The main pieces of equipments that are used in this industry are (i) automated embroiderers; (ii) manual embroiderers; (iii) sewing machines; (iv) *karchupi* frames; (v) handlooms; (vi) dye-spraying machines. The automated embroiderers are typically products imported from Japan and, now increasingly, China.

Several results arise from this table. Firstly, it is clear from this table that not counting the handlooms, the *ketchups frames* are quantitatively the most populous category of equipments in use in the designer goods industry of Bangladesh. These karchupi frames are used in

[18] Four-digit BSIC codes for the designer goods industry are 1716, 1721, 1722, 1723, 1812, 1813

putting a patina of folds on the main body of the apparel. The next most visible category of equipment in the table presents is about the sewing machines. Secondly, we define the technology platform for each type of establishment as a statement of capability expressed in the number of various machines and equipment. For each type of machines/equipments, we witness a predictable scaling up of the technology platform as we move across from the smallest establishments --- the micro --- to the largest establishments on the sample. This is intuitive, of course.

Before proceeding any further, it is necessary to appraise one self about how these replacement costs were evaluated. During the survey, we assessed the value of capital equipment in three ways, namely, 'replacement' cost, 'resale value' and (historical) acquisition cost. The question asked of the respondent while evaluating the replacement cost was: "What would it cost today were this piece of equipment, as it is, were to be purchased today?" The question is quite straight-forward where new equipments are concerned. But what about used machines? Now, experienced entrepreneurs or chief technologists typically have an idea about what a given piece of equipment would likely cost in today's prices. Unless the industry manufacturing that particular piece of equipment were characterized by a high rate of technological obsolescence, such ideas would likely also be fairly accurate. Our Survey Research Analysts (SRAs) were typically able to develop a warm rapport with our respondents. People largely cooperated. Thus, we were able to generate a fairly accurate characterization of the investment in fixed investment in plant and machinery (not counting value of land, building and structures) by these establishments. It would be recalled that the SME Policies Strategies 2005 stipulates that establishments with up to Tk. 1.5 million worth of plant, machinery and equipment (not counting value of land, building and structures) should be treated as 'small'. And establishments with between Tk. 1.5 million and Tk. 100 million worth of plant, machinery and equipment (not counting value of land, building and structures) should be treated as 'medium'. Now that we have this data relating to replacement cost on hand, we shall now be able to classify sample observations according as whether they are 'micro or small' or 'medium', from the perspective of SME Policy Strategies 2005.

Table 1.15 is about the economics of the technology platform characteristics of the designer goods industry. Here, we present average price of each type of machine or equipment for each of the size classes of establishments. Several findings from this table rate a mention.

Firstly, it is the embroidering machine that represents the richest segment of the designer goods industry, with each 18-head embroiders costing something like Tk. 3 to 3.5 million. These machines are the work-horses of hundreds of small, medium and large embroiders that have sprang up in the country since about 2000 or 2001, the year when knitwear segment suddenly started to look as if this was the new kid on the block.[19] As Bangladesh's luster brightened as a source of knitwear, the backward-linkage demand for the services of establishments that invested in embroidering machines, Japanese first, Korean next and Chinese last of all, became all the rage. Within the short span of some 6 to 10 years, Bangladesh witnessed the birth of some 500 or more embroidering establishments. Time was a couple of years ago that this niche was well-known for being a rich vein for quick money to be made.

[19] Unlike ready-to-wear garments, knitted apparel tend to vastly more differentiated as a product. The differentiation primarily is about creating different visual effects on apparel substrates based on embroidered patterns, to name the most important method for such differentiation.

The other categories essentially combine a rag-tag of small-ticket equipments and tools that provide services to the production houses as they have to take fabrics and other substrates through the life-cycles of manufacturing.

Table-1.15: Equipment replacement cost per unit in the Designer goods industry

Enterprise Status	Average price of different machines						
	Embroidering Machine (automated)	Embroidering Machine (manual)	Sewing Machine	Karchupi frame	Spray machine	Specialized Handlooms	Others
Micro	3000.0	0.0	5.0	1.50	0.0	14.80	0.0
Small	3437.1	12.87	5.5	2.88	17.50	10.31	5.87
Medium	3694.3	17.14	4.41	3.42	13.50	17.66	17.85
Large	3060.0	11.28	4.64	0.75	4.00	15.42	8.75
Mismall	3425.6	12.87	5.46	2.60	17.50	11.96	5.87
Melarge	3592.0	14.21	4.50	2.53	8.75	16.10	15.83
All	3500.3	13.72	4.94	2.56	11.66	13.40	12.76

Source: SMEF Survey, 2008

Note: All numbers in the foregoing table are based on replacement costs of the equipment

Foregoing two tables enable us to estimate total replacement cost of all plant and core machinery in use in the industry. This is presented in Table 1.16.
It is found that using embroidering machines to create custom-designed patterns on substrates provided by both cotton, synthetics and knits (of an assorted kind) is the mainstay---even the entire bulk---of the designer goods industry. Overall, about 94.6% of all investment in plant and machinery in this industry comprises of embroidering machines of the automated kind. Handlooms come in at a very distant second position, with a minuscule 3 odd percent of the total investment in plant and machinery.

Table-1.16: Total replacement cost by types of Designer goods technology setup, 2007

Firm size class	Embroidering Machine (automated)	Embroidering Machine (manual)	Sewing machines	Karchupi frames	Spray machine	Specialized Handlooms	Others	Total
Micro	12000.0	0.0	20.0	6.0	0.0	109.5	0.0	12135.5
Small	9727.0	40.9	22.4	24.3	7.0	251.8	10.9	10084.3
Medium	20725.0	84.0	54.9	108.8	20.3	641.6	668.1	22302.7
Large	41004.0	293.3	147.1	22.5	18.0	980.2	100.6	42565.8
Mismall	9831.5	40.9	22.2	20.5	7.0	232.1	10.9	10165.1
Melarge	24389.7	193.1	86.4	79.1	26.3	891.9	501.3	26167.9
All	16416.4	130.3	61.6	48.1	18.2	438.7	237.6	17351.0

Source: SMEF Survey, 2008

Table-1.17: Percentage structure of investment cost per firm by types of firm, 2007

	Percentage distribution of total cost of machinery by size classes of establishments							
	Embroidering Machine (automated)	Embroidering Machine (manual)	Sewing Machine	Karchupi frame	Spray machine	Specialized Handlooms	Others	Total
Micro	98.88	0.00	0.16	0.05	0.00	0.90	0.00	100
Small	96.46	0.41	0.22	0.24	0.07	2.50	0.11	100
Medium	92.93	0.38	0.25	0.49	0.09	2.88	3.00	100
Large	96.33	0.69	0.35	0.05	0.04	2.30	0.24	100
Mismall	96.72	0.40	0.22	0.20	0.07	2.28	0.11	100
Melarge	93.20	0.74	0.33	0.30	0.10	3.41	1.92	100
All	94.61	0.75	0.36	0.28	0.10	2.53	1.37	100

Source: SMEF Survey, 2008

Table 1.18: Utilization and valuation of land resources used on the sample

Farm status	Particulars regarding land						
	% of cases owning land on which business done	% of cases renting land on which business done	% doing both	land use per firm (sq ft)	amount lease/ Month	Amount given at once (in 000 tk)	Value of own land in 2007 per firm (Tk. million)
Micro	55.56	33.33	11.11	2175.97	17000	500.0	1.05
Small	39.68	53.97	6.35	2831.4	21033	202.5	2.37
Medium	33.33	60	6.67	7227.92	43231	803.9	6.14
Large	50	50	0	35297.91	68000	700.0	16.56
Mi small	41.67	51.39	6.94	3448.09	20682	212.8	2.0
Melarge	36.84	57.89	5.26	13165.8	46578	789.0	10.11
All	39.53	54.26	6.2	7767.07	32227	454.8	6.05

Source: SMEF survey of six sectors, 2006/07

1.4.4 Capital-labour ratio, Average Physical Product (APP) and Marginal Physical Product (MPP)

Factor proportions---the proportions in which labour and capital are utilized in production by the establishments --- constitute an important dimension of a narrative concerning the technology platform in any real-life industry. Bangladesh is a labour-surplus but capital-deficient economy. The use of capital relative to labour is therefore emblematic of how parsimoniously is capital combined with the relatively surplus labour in an effort to create value-added in manufacturing. Motivated thus, we have estimated capital-labor ratio for the sample. The measure of capital in this context is always based on the fixed capital used by the establishments. By fixed capital, we mean replacement cost of plant and machinery, plus the value of other support capital stock (such as vehicles, generators, furniture and fixtures, and the like).

Economic theory suggests that both labour and capital productivities depend upon the factor proportions that are binding. Certain production processes---such as fertilizer, steel, etc. --- are inherently machine-paced, requiring high degrees of mechanization and high ratios of fixed capital to labour used. These processes are more likely to be relatively integrated production technologies. Certain other production processes represented inherently more fragmented technologies, with different factor proportions in different segments of the plant. For instance, while the manufacture could use relatively little automation, packaging might involve high degree of mechanization and automation. In Bangladesh, the preparation of processed food increasingly resembles this narrative. Be that as it may, the point that seems presently important is to stress that factor productivities closely correspond to factor proportions, and have therefore to be discussed in combination.

The theory is that capital is the scarce factor of production and labour is the relatively abundant factor of production. More mechanized techniques of production represented by more modern and faster and more sophisticated machinery set up cost more to create and therefore to acquire. In theory, a production process of which the factor proportions are relatively higher compared with another one embodies more capital and technology resources per unit of labour---the abundant resource--- and ought therefore to produce more per unit of time. This is why it is imperative to glean an idea of where the factor proportions are in any study industry.

We find that capital labour ratios are at their highest in the case of the embroiderers that employ Japanese machinery, with 18 heads, each employing 8 workers per shift (of eight hours). More recently, Chinese capital-goods industry has turned out competing version of these 18-head machines. The Japanese machines each cost at the present time the equivalent of US $ 70000-90000. The hourly production capacity of this block of capital equipment is roughly 6 million stitches per hour, and the proprietor's piece rate for that amount of work is US dollar 65 per 10 million stitches. Capital-labour ratio on this equipment is US $ 4375.

The next highest level of capital-labour ratio involve the computer-aided embroiderers that are sourced from China/South Korea. They too typically employ 2 workers per shift (of eight hours), and cost at the present time the equivalent of some US $ 55000 to 60000. The hourly production capacity of this block of capital equipment is roughly 4 million stitches per hour.

Wooden frames which cost on average Tk. 18000 are also used in the embroidery work. These are single-worker devices, and now made locally. An elaborate system of piece-rates have been established in this industry: such rates are differentiated by the kind of product, by the gender of the ultimate user, and the expensiveness of the fabric that will become the substrate.

1.4.5 Average Physical Productivity of Labour and Machine

Table-1.19 shows the factor proportions prevailing in Bangladesh's designer goods industry.

Table 1.19: Capital-labour ratios and physical productivity in Bangladesh's Designer Goods Industry, 2006/2007

Enterprise Status	Capital-labour ratio (Tk. 000s)	Labour productivity per worker (in physical 'homogeneous' units)	Machine productivity per machine (in physical 'homogeneous' units)
Micro	603.5	78.6	79.4
Small	93.7	138	1134.2
Medium	284.6	164.8	1406.1
Large	988.5	57.6	1177.7
Mismall	82.2	133.3	1050.9

Enterprise Status	Capital-labour ratio (Tk. 000s)	Labour productivity per worker (in physical 'homogeneous' units)	Machine productivity per machine (in physical 'homogeneous' units)
Melarge	223.2	136.3	1345.4
All firms	70.9	134.7	1185.6

Source: SMEF Sample Surveys 2008.

Several findings deserve being expanded upon. First, capital-labour ratio is found to increase monotonically from the 'micro' to 'large' establishment classes. The average capital-labour ratio of the MeLarge establishment class is more than two times the corresponding number for the MiSmall establishment class. The difference is statistically significant. Overall, the sample returns an average capital-labour ratio of just short of Tk. 10000. The next column in Table presents (weighted) Average Physical Product in units of the homogeneous output for the industry. This is merely obtained by dividing, for each size class, total physical output by the corresponding sum of firms' employment. Similarly, average machine productivity is obtained by dividing, for each size class, total physical output by the corresponding sum of firms' number of core machines. Before proceeding any further, we would like to say a couple of things about why the APP appears to vary somewhat erratically from one size class to the next.

The estimate we get in homogeneous-output unit depends upon the output-mix itself. And because we obtain homogeneous-output unit by using price relatives between the 'benchmark' product segment and other comparator segments, the quality of the output in those segments also becomes privy to the estimates we get of the homogeneous-unit output. Having regard to this caveat, we note that MiSmall and MeLarge firms score more or less equally when it comes to Average Physical Product---133 *versus* 136 units of homogeneous output. When it comes to Average Machine Product (AMP), MeLarge establishments open up an edge *versus* the MiSmall establishments. The margin of the MeLarge's advantage is of a non-negligible 28%.

1.4.6 Marginal Physical Productivity

Having discussed the technology platform in some detail, we now move on to characterizing technologies in terms of their underlying production-function characteristics. To do so, we shall need estimates of $\frac{dQ}{dL}$ and $\frac{dQ}{dM}$, where Q relates physical output, L denotes employment and M denotes the number of machines. We simply invoke ordinary least-square regressions of Q over L and M respectively in order to estimate the foregoing marginals. That is, these two are simply the estimates of the coefficients obtained by regressing Q on L or M, as the case may be. Estimates of these two marginals across firm size classes are presented in the second and third columns of Table 1.20. Such marginal are however not scale-neutral. The concept of elasticity is however scale-neutral---that is why we have also calculated the elasticities of output, at arithmetic mean level, corresponding to labour and number of machines, and presented them in Table 1.20.

Table 1.20: Productivities, elasticity's with respect to labor and number of machines, designer goods industry, 2007

Farm status	Labour productivity	Machine productivity	Average labour	Marginal product of labour	labour Elasticity	Average Quantity
Micro	95.93	102.5	6.17	175.104	172.49	626.36
Small	200.87	1604.65	27.3	142.633	72.35	5381.93
Medium	182.02	1587.27	61.79	268.519	144.91	11449.83
Large	122.23	2002.27	702.71	26.172	50.89	36139.45
Mi small	192.58	1486.06	25.63	166.043	84	5066.49
Me- large	166.14	1697.51	232.03	28.992	37.36	18008.02
All	180.5	1582.72	119.99	31.09	34.07	10950.04

Source: SMEF survey of six sectors, 2006/07

1.4.7 Cobb-Douglas Production Function

No discussion of physical productivities can proceed very far before invoking tried and tested concepts of production function, such as Cobb-Douglas (CD) or Trans-log (TL) production functions. These production function provide a representation of the production technology that underlie the actual situation of a given sample of firms. To a discussion of these two classes of production as established by our data that we now turn.

CD has been the functional form of a production function of the longest standing in the applied economic literature. This well-known function is represented by the formulation:

$$Q = AL^{\alpha}K^{(1-\alpha)} \quad \text{..(1)}$$

Where Q represent the level of output;
A represents, in an abstract sense, the state of the technology;
L represents the amount of labour used by the technology;
K represents the amount of capital used by the technology.

With a suitable logarithmic transformation of the equation (1), we get

$$Ln(Q) = LnA + \alpha LnL + (1-\alpha)LnK \quad \text{..................................(2)}$$

Alternative production functions include the Cobb-Douglas and CES (Constant Elasticity of Substitution) production functions. The Cobb-Douglas production function is given by:

$$\ln Q_i = \beta_0 + \sum_j \beta_j \ln X_{j,i} + \varepsilon_i$$

All inputs are preferably to be measured in physical units. Thus Q will be measured for the designer goods industry using physical units (eg yards or pieces), L will be measured using person-years and capital in capital-years.

With a CD production function, the returns to scale is unity, and the elasticity of substitution between labour and capital is also equal to unity. There have been a large number of studies using Bangladeshi data of whether the Cobb-Douglas formulation remains a relevant representation of the underlying technological relationship between input and output in several industries.

A more flexible form of production function that is worth considering here is the Trans-log Production Function. The most frequently used being a translog function, which is a second order (all cross-terms included) log-linear form. This is a relatively flexible functional form, as it does not impose assumptions about constant elasticities of production nor elasticities of substitution between inputs. It thus allows the data to indicate the actual curvature of the function, rather than imposing *a priori* assumptions. In general terms, this can be expressed as:

$$\ln Qi = \beta 0 + \sum_j \beta j \ln Xj,i + \frac{1}{2}\sum_j \sum_k \beta j,k \ln Xj,i \ln Xj,k + \varepsilon i$$

where $Q_{j,t}$ is the output of the establishment j in period t and $X_{j,i,t}$ and $X_{j,k,t}$ are the variable and fixed establishment inputs (i,k) to the production process. As noted above, the error term is separated into two components, where $v_{j,t}$ is the stochastic error term and $u_{j,t}$ is an estimate of technical inefficiency.

1.4.8Empirical Implementation of the Production Function

Of both the CD and TL production functions, we implement two versions each. The first of these is a traditional CD functional form, in which output is said to be a function of just labour and capital. Labour in this case is about all kinds of labour, including the white collar workers too in the mix. Capital is about fixed capital, about which we have had occasion to say quite a few things already. The alternative functional form throws into the melting pot a third variable, namely, the sumtotal of material inputs. Such inputs include raw materials of all kinds that have been used in production. We estimate each of the production functions in one of three alternative versions, the chief differentiator among these three is whether we measure the 'output' in physical or value terms. Where output is in physical terms, the dependent variable is measured in units of the homogeneous-output already talked about. In that case, labour and inputs are also measured in physical terms---labour in person-years, and input in units of homogeneous-inputs.[20] Fixed capital is always measured in monetary terms. When it comes to estimating the production function in TL forms, having three explanatory variables mean that there are in all nine variables on the right hand side of the production function form (not counting the constant term). The following table presents the estimates of the coefficients of both forms of the production function.

Table 4.21: Coefficients of production functions (of various kinds), 2006/2007

Explanatory variable	Cobb-Douglas: version 1		Cobb-Douglas: version 2		Trans-log: version 1		Trans-log: version 2	
	Coeff.	T-stat	Coeff.	T-stat	Coeff.	T-stat	Coeff	T-stat
Constant	2.73*	6.23	2.78*	6.12	-0.77	-0.51	-1.87**	-1.24
Ln(labour)	0.81*	9.58	0.81*	9.42	1.49*	2.74	1.66*	3.17
Ln(capital)	0.31*	5.75	0.31*	5.75	0.882*	2.28	0.98*	2.61
Ln(input)			-0.01*	-.43			-0.042	-0.06
Ln(labour)^2					0.087	0.92	0.217*	2.18
Ln(input)^2							0.036*	3.07
Ln(capital)^2					-0.19	-0.29	-0.046	-0.67
Ln(labour)*ln(capital)					-0.119	-1.54	-0.122	-1.62
Ln(labour)*ln(input0							-0.087*	-2.69
Ln(capital0*ln(input)							0.017	1.1
R^2	0.604		0.604		0.623		0.654	
F-ratio	104.31		69.188		44.342		30.915	

Source: SMEF survey of six sectors, 2006/07

Estimates of the regression coefficients from a CD functional form are also estimates of the elasticity of the function with respect to those arguments of the function. Output has an

[20] Once again, we use price relatives, this time for inputs, in order to 'chain' comparator inputs into units of 'benchmark' input.

elasticity of 0.8 with respect to labour, and of 0.307 with respect to capital. The F-ratio---which is a summary measure of how well-specified the functional form under review is for the data on hand for the most parsimonious form of the CD function is the higherst, at 104.3. After we throw 'input' into the mix, the F-statistics, although still large, fell for all to see. According to the Cobb-Douglas specification, the returns to scale is constant. Both coefficients are highly significant and intuitively signed. The TL function too is fairly well-behaved, with most of the coefficients being intuitively signed and statistically significant.

TL functional forms add slightly to the r-squarred, but subtract from the F-ratio.

We also test for whether returns to scale are constant in this industry. The steps adopted leading up to the test are as follows:

1.4.9 Estimating returns to scale in the designer goods industry of Bangladesh

Some production functions are linearly homogeneous of degree one. A production function is linearly homogeneous of degree one when doubling the quantity of each input in the production function also doubles the output that can be obtained from it. Alternatively put, the returns to scale on a linearly homogeneous production function of degree one are also unitary. In such a case, returns to scale are also said to be constant. It is of some importance to be testing the foregoing two estimated production functions for the constancy of the returns to scale. It is now to this that we turn. We now test for whether returns to scale are constant in this industry. The steps adopted leading up to the test are as follows:

The hypothesis of constant returns to scale is $\hat{\beta}_L + \hat{\beta}_K = 1$
The F statistic for the hypothesis of a Cobb-Douglas model is

$$F = \frac{\left(\hat{\beta}_L + \hat{\beta}_K - 1\right)^2}{Var(L) + Var(K) + 2 \times Cov(L, K)}$$

The following about table shows that in both cases (of versions 1 and 2), the calculated value of the F statistics is much, much lower than the critical value. We can't reject the null hypothesis of returns to scale being constant and unitary for designer goods industry.

Sector	F statistic Version 1		F statistic Version 2	
	F value	Critical value	F value	Critical value
Designer goods industry	0.00109	3.93	.000756	3.07

For this industry, we find that the null hypothesis that returns to scale in it are constant can not be rejected. Increasing returns to scale are not proven for the designer goods industry.

1.4.10 Determinants of labour productivity

We next turn to the determinants of labour productivity across firms. The explanatory variables on which we regress estimates of labour productivity include the following:

(i) Average product price (APP);
(ii) Fixed capital per worker (CLR);
(iii) Automation dummy variable (AUTO)
(iv) Length of formal schooling on the part of the Managing Director (EDU)
(v) Three firm size dummy variables;

(vi) Two location dummy variables, to correspond to location in Dhaka and Chittagong;
(vii) Age of the firm (AGE).

All quantitative variables are, wherever appropriate, are logarithmically transformed.
Estimated equations show that AGE always leads to degrading of both labour and machine productivity. Second, EDU and CLR almost always causes both labour and machine productivity to rise---an intuitive result.
Product price leads labour productivity measured in gross value added to rise, significantly.

Table 1.22: Determinants of labor productivity in the Designer Goods Industry of Bangladesh, 2006/2007

Explana-Tory variables	Labour productivity is equal to measure of output divided by employment size					
	Labour productivity(output)		Labour productivity(gva)		Labour productivity(Revenue)	
	Coefficient	T-Stat.	Coefficient	T-Stat.	Coefficient	T-Stat.
(Constant)	8.97*	11.99	6.231*	8.46	2.07*	2.77
Automation	-0.28	-1.60	-0.20	-1.06	-0.28	-1.60
LN_AGE	-0.20*	-2.12	-0.30*	-2.97	-0.20*	-2.09
LN_EDU	0.15*	2.15	0.18*	2.38	0.15*	2.11
Ln_f_c	0.20*	4.23	0.23*	4.48	0.2*	4.21
ln(app)	-0.77*	-9.87	0.21*	2.45	0.23*	-2.96
R^2		0.51		0.32		0.27

Source: SMEF survey of six sectors, 2006/07

Table-1.23: Determinants of machine productivity in the Designer Goods Industry of Bangladesh, 2006/2007

	Machgine Productivity					
	Machine productivity(output)		Machine productivity(gva)		Machine productivity(revenue)	
	Beta	t	Beta	t	Beta	t
(Constant)	8.58*	7.84	1.36	1.24	1.5	0.74
Dummy of technology	0.49**	1.81	0.55*	2.04	0.89*	1.91
LN_AGE	-0.32*	-2.28	-0.39*	-2.75	-0.43**	-1.68
LN_EDU	0.23*	2.12	0.27*	2.52	0.14	0.74
Ln_f_c	0.36*	5.00	0.41*	5.64	0.38*	2.98
ln(app)	-0.73*	-6.38	0.20**	1.68	0.23	1.08
R^2		0.49		0.49		0.23

Source: SMEF survey of six sectors, 2006/07

1.4.10.1 The need to deal with simultaneity bias in ordinary least-squares

It is typical in traditions of applied production research literature to estimate coefficients of production functions using a single-equation estimator. Many example of such a use of such a procedure can be found in the literature relating to manufacturing industries of Bangladesh. It needs to be pointed out categorically that the use of such a procedure leaves something to be desired. It has been well-established for sometime now that in specifications such as this one, the disturbance term is correlated with measured labour input or measured capital input. Because only the quantity of the measured labour or capital input enter the equation (1) or (2), the worker quality can only appear to be a part of the disturbance term.

The quality or the relevance of experience, or the educational qualification of workers will frequently depend upon the spatial distribution of the supply of opportunities of educational or training upgrading. The supply of educational or training facilities, mostly a preserve of public or voluntary-sector activities, is treated as part of the disturbance term in equation (1) and (2). And yet it is incontrovertible that this supply is not without some effect on the quality or competency or relevance of the skills of workers, which are bound to affect the average or marginal productivity of workers in the study industry. The presence of correlation between the explanatory variable and the disturbance term in equation (1) thus is a tell-tale presence of a simultaneity bias in equation (1). This needs mitigation.

On another level, it is quite likely for the measured capital input to also be correlated with the disturbance term. Why? The selection of a best-practice stock of machines is desirable for everyone, but it takes a special skill, it takes experience, and it takes specialized knowledge. To the extent there is an active market to trade such skill or knowledge, such market is unlikely to have a national footprint but is quite likely to be concentrated in the capital city or the lone port city, squeezing the locations outside the capital or the port city. To put it differently, the spatial distribution of such markets of critical importance, which affects the productivity of capital machinery, will typically be treated as part of the disturbance term. The presence of correlation between the explanatory variable and the disturbance term in equation (1) thus is a tell-tale presence of a simultaneity bias in equation (1). This again needs mitigation.

More formally, in order to obtain a quantitative measure of the contribution of factors to firms' production, we need production function parameter estimates that are consistent. A firm with high total productivity---typically lumped with the disturbance term in the econometric estimation---will hire more labour and other variable inputs. This correlation between the productivity part of the residual (seen by the firm's manager, but not by the econometrician), and the observed values of the variable results in biased parameter estimates.

We shall therefore need to implement a two-stage procedure to purge the implementation of equation (1) and (2) of the presence of simultaneity bias: in short, we shall implement an instrumental variable approach. The instruments that we shall use are as follows:

(a) The number of public-sector colleges and universities within the jurisdiction of the districts whence our sample has come;
(b) The number of public and private training institutes within the jurisdiction of the districts whence our sample has come;
(c) The number of firms selling specialized professional services (providers of technical assistance) of one kind or the other within the jurisdiction of the districts whence our sample has come;
(d) The number of branches of banks and leasing companies within the jurisdiction of the districts whence our sample has come;
(e) The number of licenced micro finance institutions (MFIs) within the jurisdiction of the districts whence our sample has come;
(f) The number of business enterprises within the jurisdiction of the districts whence our sample has come.

Using these instruments, we conducted our Two-stage Least-Squares (2SLS) estimation of both of the production functions. However, the results obtained were much degraded compared with those obtained by plain least-squares estimates. These results are therefore not presented here to prevent result clutter. We shall therefore have to do with estimates obtained from ordinary least squares regressions of the production functions.

1.4.10.2 Estimating total factor productivity (TFP) in the designer goods industry of Bangladesh

Total Factor Productivity (TFP) is defined as the part of the output that results from what is over and above the quantities of inputs that can be measured. There are two main sources of growth, whether in an enterprise or the economy as a whole. One of these parts is called factor accumulation. Factors in this context correspond to labour, capital, raw materials, and the like. A certain, in fact a major, proportion of the product is owing to factor accumulation. However, there is a second component in output that can not be ascribed to the factor accumulation, but is instead a residual. This is the part of the output that is ascribable to other than factor accumulation. Nobel Laureate Robert Solow called this as due to technical progress.

TFP is calculated using a two-stage procedure that is an instrumental variable approach. The way in which it works is that in the first stage, the explanatory variables are regressed on a fairly large number of instrumental variables. The predicted values of the explanatory variables will be featured in the second stage of the exercise. The explanatory variables in the second stage will include not just measured fixed and variable inputs but also a whole group of relevant (shifter) variables that might conceivably influence the values of the endogenous variables. The residuals obtained at the second stage will be averaged over the sample to yield a average measure of total factor productivity---this is a measure of technical progress prevailing in the sector of interest. This value will lie between 0 and 1: the higher close to unity is the value of this TFP, the better is the state of TFP prevailing in the industry or sector in question.

Provisioning of assets---access to physical capital (such as plant and machinery, etc.), human capital (education, skills, technological cognitive abilities, etc.), financial capitall (debt, retained earnings, etc), social capital (brand power)--- and productivity are major factors behind productive self-employment. Variations in quantity and quality of provisioning of public goods --- spatial access and location, density of banking infrastructure, agglomeration benefits arising due to “clustering effects”, the density of market channels, information and skills-building infrastructure, etc. --- usually are an important source of spatial variations. Many of these variables have putative effects on marginal factor productivities achieved by firms. And yet they tend to be lumped merely as part of the disturbance terms in most econometric exercises. These public goods translate into significant heteorogeneities among sample firms in total factor productivities (TFP)—an important growth source. These will be brought into the scope of the analytical work that we hope to do as instrumental variables.

Using these instruments, we conducted our Two-stage procedural estimation of TFP. However, the results obtained were much degraded compared with those obtained by plain least-squares estimates. These results are therefore not presented here to prevent result clutter.

1.4.11 Estimation of Stochastic Production Function

1.4.11.1 Efficiency gap within the sample of establishments

The production functions point up a summary picture which holds true for the sample in question as a whole. This same is true when it comes to estimates of the total factor productivity function---another set of summary results. These results appeal well when one is interested in sample-wide insights. If, as is quite likely, one is interested in intra-sample insights and results, estimates of production function strike one as if 'one is dressed well with no place to go'. One is in this uncomfortable position whenever, as now, diagnostic results and diagnostic insights are warranted. Here, one is interested in getting estimates of inter-firm 'scores' or 'ratings' even as one uses data on firms' output and inputs in an effort to see how the two stack up.

It is here that we, like many researchers before us, invoke the stochastic frontier function (SFF), which was first independently by both a Dutch team of econometricians, and also by Aigner, Lovell and Schmidt. The specification of the SFF is as follows:

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$$\ln Q_{j,t} = \beta_0 + \sum_i \beta_i \ln X_{j,i,t} + \frac{1}{2}\sum_i \sum_k \beta_{i,k} \ln X_{j,i,t} \ln X_{j,k,t} - u_{j,t} + v_{j,t}$$

where $Q_{j,t}$ is the output of the establishment j in period t and $X_{j,i,t}$ and $X_{j,k,t}$ are the variable and fixed establishment inputs (i,k) to the production process. As noted above, the error term is separated into two components, where $v_{j,t}$ is the stochastic error term and $u_{j,t}$ is an estimate of technical inefficiency. Empirically, what we have done is as follows:

Using sample observations concerning measures of both output and input(s), and using Maximum Likelihood Estimators, we estimate coefficients of the corresponding coefficients that maximize the likelihood of observing the combinations of the output and inputs we have on our hands. Using estimates of the variances of both normally-distributed error and the half-normal error using values of sample observations, we estimate the stochastic frontier (Table 25). We then estimate the value of the efficiency, which we measure by value added, 'predicted' by the labour-capital combination for each sample observation. Ultimately, we then calculate for each firm its distance from the 'estimated frontier'.

The formulation is such that it is practicable to calculate the productivity deficit of each sample observation from the 'stochastic frontier' for the industry in question. This is how we plan to calculate the productivity gap of each of the clusters relative to the frontier production function estimated for that industry.

Using stochastic production frontiers in differentiating the firms on any given sample in terms of a well-accepted metric of firm performance is an oft-used method in applied industrial research. We, too, would be using such a method. We reproduce below work in which distance of sample of observations from an estimated stochastic frontier is regressed upon quite a number of explanatory variables in order to generate a diagnostic analysis of some value.

Table 1.24: Estimates of the coefficients of the stochastic frontier production function, using MLEs

Frontier estimate				
Coefficients	**least square estimate**	**t-value**	**Half normal estimate**	**z-value**
Constant	2.73*	6.23	3.9*	10.22
β_L	0.81*	9.58	0.834*	4.67
β_K	0.31*	5.75	0.181*	4.47
σ_v			1.003	
σ_u			0.02	
σ			1.007	
λ			0.2	

Source: SMEF survey of six sectors, 2006/07

1.4.11.2 The Drivers of Estimated Technical Inefficiency

Following the lead of the analytical model developed in Annex-II and using estimates from Table 25 of the standard errors of the two components of the error term---one distributed as a normal variate and the other distributed as a truncated, half-normal variable, we estimate the 'distance' of the value added registered by each sample observation (which is a kind of measure of efficiency) from an estimated stochastic production frontier. We then regressed this distance on a number of behavioural or strategic choice variables, such as opting for (or obtaining a) bank loan, fixed capital provisioning per workers, average product price, etc. The explanatory variables on which distance from the frontier is regressed include the following:

EDUC= Number of years of schooling of the Managing Director's formal schooling (natural log of years);
PER_EXP = % of the firm's output that is exported;
CHT_DUM = A dummy variable that takes the value of unity for Chittagong and zero everywhere else;
DHK_DUM = A dummy variable that takes the value of unity for Dhaka and zero everywhere else;
AV_P_PR = Average product price (natural log of Taka);
B_LOAN = Bank loan;
AGE = Number of years since the establishment of the firm;
The following table presents the results obtained from the regression analysis:

(1) Having a bank loan reduces distance from the production frontier. This suggests that bank loans induces greater efficiency in this industry compared with firms that are more internally financed;
(2) Enhancing the formal education length of the Managing Director is found to have a positive effect on the efficiency of the firm;
(3) Average product price fosters greater inefficiency, presumably by breeding complacency.
The point of presenting these results is that one can harness relatively advanced methods and still demonstrate results with diagnostic values in formulating policy stances. Certainly, in this implementation, we would be spending a lot of time trying out various models of policy diagnostics on the data that we shall generate for the SMEF and the MOI.

Table 1.25: Determinants of the distance from the estimated stochastic production frontier

Model	Unstandardized Coefficients		t
	B	Std. Error	
(Constant)	1.797	.257	6.993
EDUC	-.025*	.012	-1.989
PER_EXP	-.003**	.002	-1.743
CTG_DUM	-.160	.263	-.609
DHK_DUM	.071	.206	.344
AV_P_PR	4.035E-06*	.000	7.906
B_LOAN	.000**	.000	-1.720
AGE	-.005	.009	-.532
R^2		0.47	

Source: SMEF survey of six sectors, 2006/07

Note: One asterisk shown in the column labeled 'T-stat' shows the variable is significant at 5% error probability level; two shows significance at 10% error probability level

1.5 Access to Finance Regime in the designer goods industry

1.5.1 SMEF Sample Survey results about access to finance

Before we could present an analysis of the access to finance on the part of SMEs, we need a framework of discussion as to what we shall mean by access to finance regime? The regime typically involves the following narrative variables, namely, (1) size structure of loans; (2) structure of interest rates.[21] . We recognize two categories of loan---namely, institutional, non-institutional and trade credit.[22] The issue remains that the coverage of the data relating to institutional and non-institutional loans is better compared with trade credit. That is why we also present weighted average using two alternative bases. One of these bases only takes

[21] One could also argue that (1) structure of outstanding loans with respect to the value of fixed collaterals; (2) the age-structure of arrearages ought also to be included in the definition of finance regime. We agree completely. We made an effort to also collect data on outstanding loan values and their age structure. It is in the area of access to finance that the degree of cooperation of our respondents with the survey was the most lackadaisical, if not outright adversarial. In a very large proportion of cases, the respondents simply refused to discuss the issue of 'outstanding loans' and 'age '

[22] Trade credit is also recognized in our data. For three of our sectors, respondents cooperated more than in others as far as interest rates on trade credits. For the sectors where the data were the most inclusive, trade credit averaged roughly at 33.3% annually. It is this average that we have used for the other three sectors where data was not available.

into account institutional and non-institutional loans. Trade credit is missing from the other. We present information concerning loan sizes with respect to three borrower situations, namely, institutional loans; non-institutional loans and trade-credit.

1. 5.1.1 Structure of loan sizes

Table 1.26 presents results concerning several indicator variables cited above, namely, the proportion of establishments with access to institutional loans, average loan size and average interest rates. For each category of loans types, we also present information about interest rate structures.

1. 5.1.2 Loan sizes' structure of bank loans

Among the establishments of the designer goods industry of Bangladesh, the proportion that has a loan from at least one scheduled bank or leasing company is 25%---in all, there have been 35 cases of a firm taking a bank. The average bank loan size in this industry is Tk. 0.606 million. The average maturity of the loans in this sector is 3 years. Those are the averages. However, there is a very significant dispersion of both loan sizes and interest rates around this average with regard to firm size variable. The following table clearly shows that as compared with MiSmall establishments, medium and large establishments (represented by MeLarge establishments) have significantly larger bank loan contracts---Tk. 812.7 thousand *versus* Tk. 432.9 thousand[23]. That difference is statistically highly significant: after all, the average provisioning of bank loan for the MeLarge is almost twice as large as for MiSmall establishments. More important, MeLarge establishments are found to be out-lent *versus* MiSmall establishments by a factor of 2.36:1, when we take the entire sample into account. Significantly enough, as compared with MiSmall establishments who are dwarfed in terms of the loan size, the rates of interests paid by MeLarge establishments are statistically the same. The evidence is therefore clear that MiSmall establishments are somewhat under-banked compared with MeLarge establishments.[24]

The prominence of credit on the books of account of SMEs is important not for academic reason. It is for an entirely practical reason. And the reason is that the amount of credit is a major determinant of the per-worker output in the industry, even after controlling for several relevant variables. That is why it is important to profile both the MiSmall and MeLarge establishments in terms of the extent to which their credit "requirements" for access to finance at affordable rates of interest are acceded to. Entrepreneurs in the MiSmall category are clearly credit-constrained.

[23] These averages are only calculated based on cases where a loan contract was issued to the sample observation.
[24] We have put this conclusion a little euphemistically. It is quite correct to say that the degree and the provisioning of institutional credit by medium or large establishments would be understated to a greater degree compared with MiSmall establishments. For a larger proportion of the cases, the MeLarge establishments were characterized by non-response to questions concerning the fact and the extent of bank loans or loans from leasing companies.

Table 1.26: Structure of institutional loans taken by establishments in Designer Goods Industry, 2006/07
(Tk. 000s)

Farm status	No. of bank loan taker	% of cases with bank loan	Average loan size of firms that received bank loans	Average loan size taking all firms	No. of leasing company loans	% of interest for bank loan
Micro	1	16.7	333.0	55.5	0	17.0
Small	16	22.9	441.6	100.9	0	15.1
Medium	14	29.8	952.1	283.6	0	14.63
Large	4	23.5	403.1	94.84	0	19.0
MiSmall	17	22.4	432.9	96.8	0	15.91
Melarge	18	28.1	812.7	228.5	0	15.93
All	35	25.0	606.3	151.57	0	15.92

Source: SMEF survey of six sectors, 2006/07

Among the establishments of the designer goods industry of Bangladesh, the proportion that has a loan from at least one non-institutional loan is only 2.14%---in all, there have been 3 cases of a firm taking a non-institutional loan. The average loan size of a non-institutional loan contract is Tk. 27.1 thousand. The designer goods industry does not have much exposure to non-institutional credit. One reason that this is true is that the pioneers in this particular sector tapped a quite rich artery of what the industry itself called 'quick money'. The firms that entered into this industry early on were typically flush with liquidity. Consequently, the entrepreneurs in this sector don't really have much of a demand for high-cost non-institutional credit.

Table 1.27: Structure of non-institutional loans by establishments in Designer Goods Industry, 2006/07 **(Tk. 000s)**

Firm size	No. of non-Institutional loans taken	% of cases with loans	Average loan size of firms that received loans	Average loan size taking all firms	% of interest for bank loan
Micro	0	0	0	0	0
Small	2	2.82	40.6	1.16	30
Medium	0	0	0	0	0
Large	10	5.88	71.4	42.0	20
Mi small	2	2.6	35.4	0.43	30
Melarge	10	2.33	16.4	2.56	20
All	12	2.14	27.1	2.32	26.7

Source: SMEF survey of six sectors, 2006/07

Table 1.28: Structure of trade credit availed by establishments in Designer Goods Industry, 2006/07

Firm size	No. of trade credit taker	% of cases with trade credit	Average loan size of firms that received loans	Average loan size taking all firms	% of interest for trade credit
Micro	3	50	350.39	175.2	24
Small	25	35.21	426.75	152.4	32.95
Medium	14	53.85	1119.17	333.37	48.9
Large	4	23.53	4404.11	1036.3	29.48
MiSmall	28	36.36	418.27	154.1	31.88
MeLarge	18	41.86	1849.15	520.1	44.58
All	46	32.86	990.62	325.5	37.19

Source: SMEF survey of six sectors, 2006/07

Among the establishments of the designer goods industry of Bangladesh, the proportion that has a loan from at least one non-institutional loan is only 32.86%---in all, there have been 46 cases of a firm availing of trade credit. The average loan size of a trade credit deal is Tk. 990.62 thousand. That said, the size of trade credit per establishment is Tk. 325.5 thousand. The designer goods industry has a good deal of exposure to trade credit.

Table 1.29: Weighted average Interest rates

Farm status	weighted interest rate	weighted interest rate(without trade credit)
Micro	21	17
Small	24	16
Medium	33	15
Large	28	19
Mi small	24	16
Melarge	36	16
All	29	16

Source: SMEF survey of six sectors, 2006/07

1.5.2 Needs and requirements for finance in the designer goods industry of Bangladesh

Capital earns a return because rational economics agents have a positive time preference: consumption today is preferred to consumption tomorrow. Capital intrinsically involves the sacrifice of consumption, for which the contributor of capital will demand a reward. In business, capital in use comes in two forms---fixed capital and working capital. The two intrinsically differ in the treatment of time each is imbued with. While working capital is about the capital that typically has a life of one year, fixed capital will involve sacrifice of consumption over many years. Both forms of capital are valuable, and that is why both are needed by enterprises.

Financial requirements of firms are of two major categories. The first is about the need for long-term finance, typically required by enterprises as they go about setting up investment projects with life-times exceeding many years. Typically, this is called ‘the need for term loan’. And then there is the need for short-term loan, defined to extend to maturities of up to a year. Medium-term loans are defined to extent to maturities of between 12 months and

36 months. In this report, we mainly concentrate on loans with maturities of up to 12 months.

Because the rates of interest in Bangladesh are among the highest in Asia, and the chill from global competition, including from Asia's two humongously large economies, among the greatest, the demand for long-term loans is relatively small. The universe for such loans is populated largely by well-capitalized 'corporate' financing clients whose capacity to service such loans is a 'no-brainer'. Commercial banks avidly seek the custom of such tier-one customers, sometimes offering attractive interest rate discounts. Banks do actively take into account the fact that such large corporate customers generate much more business by way of service charges based on their import trade and L/C margin and the like. They stand to gain more in the swings than lose in the roundabouts.

There is also some *a priori* evidence that short-term loans are more quick-disbursing and account for a majority of the credit "requirements" of the SMEs in Bangladesh. Some evidence in support of this can be seen in the work of Chowdhury and Rahman (2008). When the Bangladesh Bank and the IDA capitalized an window for funding the Small Enterprise Fund (SEF) based on a re-finance --- as opposed to pre-financing --- scheme, traders applying for short-term loans accounted for by far the largest percentage of the disbursements out of this fund (Chowdhury and Miah, 2006; Chowdhury and Rahman, 2008). The assertion is also supported by data available from the Bangladesh Bank, relating to the distribution of advances with respect to loan maturities. To quote: "short-terminism seems to be the order of the day (Chowdhury and Miah, 2006)." Working capital requirements thus happen to be a key vantage-point for appraising a financing industry from the perspective of SMEs. It has to suffice for the moment as the basis for the presentation of our results about the extent to which access to finance is the binding constraint for SMEs in Bangladesh.

The following few paragraphs are about how we measured the quantum of fixed and working capital that are needed by enterprises. We start with fixed capital requirements. But first we need to share a few caveats with you.

Capital machinery is bought based on a production plan that extends over many years of life. In the interim, of course, the level of demand for the output of the industry in question will be subject to all manners of fluctuations, ranging between those associated with trend variables, cyclical and seasonal factors, even random fluctuations. The typical situation of a manufacturing establishment in Bangladesh is where it reports that capacity for production --- and this reflects the use of fixed capital in the business --- is less than fully utilized. Capacity utilization the size of 60 or 70% of economic rated capacity, which is accurately characteristic of the particular industry under study in this sector report, is emblematic of a situation of excess supply of fixed capital. In a land that suffers from conditions of scarcity of capital, a spectacle of excess fixed capital is itself suggestive that it is the supply of fixed capital requirements is not the dominant problem.

There is also an intrinsic difficulty that crops up in assessing whether the requirement of fixed capital of a particular class of entrepreneurs is typically unmet. The point is that whether the supply of fixed capital financing is constricting is revealed at the first instance to the entrepreneur that, with a business plan in the attaché case, is seeking to raise start-up capital. The issue is that such an entrepreneur was almost beyond the pale for this, or for that matter for any survey such as this, simply because of the methodological requirement for a sample frame of *existing* enterprises. There is no accessible list frame of entrepreneurs having credible business plans for which capital is sought.

Our answer to this problem has been to solicit information about the relative importance of equity and retained earnings versus debt as sources of finance at start-up of the sample establishments. And we have already learnt that by far the greatest percentage of the sample establishments have had to start up with equity infusions or with retained earnings. Overall, only about 17% of the capital raised in the designer goods industry of Bangladesh has been in the way of debt.[25] Suffice it for the moment to say that the long-term, start-up, capital is in critically short supply.[26]

The rest of this discussion will seek to concentrate on working capital capita finance in assessing the gaps in the performance of the markets for capital.[27]

1.5.2.1 Assessing the state of the provisioning of working capital finance

In an article published in 1964, Professor Amartya Sen, now of Harvard University, formulated how one can get at the working capital needs of businesses. Working capital, he argued, comprises largely of five sub-components. They are (i) value of input inventories; (ii) value of work-in-progress; (iii) value of output inventories; (iv) average value of the receivables[28]; and (v) the amount of cash on hand, which generates the equivalent of 'convenience yield' of having the cash resources to prevent any situation that is akin to 'stock-outs' or 'cash-outs'. Being out of cash resources will be tantamount to doing without, and will thus be a potentially costly situation.

Needs for working capital finance closely correspond to the concept of capacity utilization. Accurate assessment of needs for any resources can only be gleaned from a prior assessment of the 'true economic' capacity, not from the 'rated engineering capacity'. Without minimizing the importance of the engineering rated capacity to industrial or production engineers, the fact remains that such engineering capacities need not closely correspond to what is, for cash-gain-maximizing firms, economically rational to produce. Before we can talk about the requirements for finance, we have to assess the economically relevant capacities of the establishments in the designer goods industry.

Respondents were asked about how many days in a year do they typically want their businesses to stay open. As well, when answering our question about the level of production achieved, we had also solicited from the respondents information about the

[25] The only other recent study to have offered any comparable insight to the one under discussion here is from the World Bank Group's Investment Climate Survey 2002. That sample was skewed towards large establishments, whereas our own sample is 'self-weighted'. Unfortunately, given the fairly highly aggregative way in which that data has been presented, it is not really practicable to get a handle on industry-specific results. It is not unusual therefore that the ICS-2002 reported a much higher prominence to debt as a source of finance. The estimate supported by the survey carried out by this team is much more representative of the broad swathe of establishments actually existing in Bangladesh.

[26] Alternatively, whether we ought to say that the demand for debt as a source of finance has been woefully small is moot too. After it takes two to tango, and in an analysis of one of the markets, such as here, there is demand as well supply to account for. Bangladesh's long-term interest rates have for long been high, especially the privatization of the banks. Over the life times of our sample observations, the interest rates for the term-lending loans have consistently been high. It is therefore no wonder that the proportionate prominence of debt as a source of finance is what it is, ie very very low.

[27] Note that Table 1.30 has been omitted from the presentation and has not been replaced.

[28] Receivables will no doubt correspond to different 'time-profiles'. There is instinctively a need for an 'averaging' in a situation like this. We derive this value while dividing the reported value of receivables by two: the average value of the receivable would naturally be an average of the 'longest' due and the 'youngest' due.

utilization of their capacities. We have now a choice between two measures of economic capacity, namely, the output equivalent of the number of days of intended operation cited by the respondent; and the capacity directly cited by the respondents. In every case, we choose the lower of the two values.

The following table presents the need or the requirement of access to finance from the perspective of the entrepreneurs themselves.

Table 1.30: Working capital provisioning per establishment (Taka 000s)

Firm size class	Raw material inventories	Finished-goods inventories	Transaction demand for cash resources(cash in hand)	Net Receivables in the market	Value of work in progress	Total working capital
Micro	265.67	24.83	13.33	71.67	0	375.5
Small	225.39	222.2	91.27	372.53	218	1129.4
Medium	1391.56	1082.38	178.72	823.55	219.04	3695.2
Large	1505	1971.45	1229.38	862.5	1340.63	6909.0
MiSmall	228.57	206.61	85.12	348.78	200.79	1069.9
MeLarge	1420.37	1308.18	445.56	833.44	503.89	4511.4
All firms	768.74	705.88	248.48	568.45	338.17	2629.7

Source: SMEF survey of six sectors, 2006/07

We estimate working capital requirement based on firms' attainment of its capacity. Our questionnaire had solicited information about the percentage capacity utilization achieved. Before proceeding any further, it is worth asking if it at all makes sense that we might try to envisage a capacity for each of the products.

We are going to argue that it makes perfect sense. Where firms are mono-product firms, evaluation of capacity is typically a straight-forward matter: one merely divides the rated *economic* capacity of the firm, evaluated in terms of the one product that it manufactures by the output, again measured similarly, and multiplied by a hundred.[29] Where, as is presently the case, multi-product firms predominate numerically, it is necessary to help respondents define the very concept of capacity so as to accommodate the plurality of the cash-gain-maximizing output-mix of firms. This has been done presently.

Table presents the proportions of revenue generated by each of the sample observation's main products. We use these percentage (or relative shares) as weights in migrating from product-specific capacity utilization estimates into an weighted average capacity utilization estimate. This is presented in Table- .It is these findings that we need to discuss more fully.

[29] Note that we are using the concept of economic capacity, and not *rated engineering* capacity. Engineering capacities in the nature of things overstate economic capacities, because they fail to factor in *economic* or *business* or *regulatory* constraints which are *force mejeure* for the firms. The firms can't relax or mitigate these constraints. Economic constraints thus always lie below engineering constraints. In the approach we made in our own measurement of capacities at the level of individual products, we were diligent in steering the conversation with the entrepreneur such that the benchmark captured for purposes of the calculation of capacity utilization was economic capacity. A second issue was about how we dealt with the issue of plant, machinery, and equipment being fungible, ie capable of being used in tandem in the production of more than just one output. This was a real problem in that many, indeed a clear majority, among our sample observations are multi-product firms. It would be quite natural for the output-mix that would maximize profitability to be treated as among the factors that determine the *economic capacities* for each of the products under study. Our survey staff tried their utmost to convey these vibes to the respondents before asking the question about product-specific capacities utilized.

We find that the weighted average capacity utilization rises in a tidy monotonic fashion across the four size classes. At 51%, the weighted capacity utilization of the micro segment is the lowest. The small establishments do considerably better, at 64%. Medium and large establishments score 68% and 73%. MeLarge establishments out-achieve MiSmall establishments by a clear 7 percentage point advantage.

We'd argue that the achievement shortfall in terms of capacity utilization is itself a measure of the extent of the deficit in the scale of the provisioning of working capital that sample firms have suffered from. On the whole, we would say that the designer goods industry is characterized by a shortfall in its working capital provisioning of some 35%. However, MiSmall establishments characterized by a shortfall in its working capital provisioning of some 38%, whereas the MeLarge establishments are characterized by a shortfall in its working capital provisioning of some 31%.

Ladies' three-in-one account for the largest single percentage share of the revenue for the sample observations, followed by sarees and then by gents' tunics (*punjabi's* and *fatua's*). As well, before proceeding any further, it is also important to address why ladies' three-in-one's and sarees are so predominantly important in the output range of the designer goods industry. Ladies designer output predates mens' designer output in Bangladesh. The first designer goods boutique that debuted in Dhaka was in 1980, selling what has come to be known as the Tangail sarees. According to Mr. Faruk-e-Azam of Chittagong, and now in his early sixties, the genesis of the designer goods industry in Bangladesh started off the response, by a collection of concerned Bangladeshis, to a raid by the policy during the Ramadan of 1979 on retail saree shops in the Gawsia area in Dhaka city, allegedly to 'root out' the buying and selling of 'foreign-made' textiles products during the then upcoming Eid-ul-Fitr. The first segment of the designer goods that this group went into manufacturing was sarees. In this sense, sarees have been the marquee offering of the designer-producers in the designer goods industry. Even today, design houses derive close to 75% or more of their revenue from marketing a captivating range of sarees, especially for the Ramadan and *baishakhi* seasons.

Table-1.31: Relative Weight of Various major products in the designer goods industry of Bangladesh

Farm status	Ladies 3-in-1's	Gents' tunics	Sarees	Denim	Knitwear	others
Micro	6.15	0	93.85	0	0	0
Small	10.72	0.27	39.81	16.32	20.23	12.65
Medium	4.84	2.27	14.4	21.79	19.83	36.87
Large	7.97	8.72	68.33	2.08	2.08	10.82
Mi small	10.66	0.27	40.5	16.11	19.97	12.48
Melarge	6.33	5.34	40.09	12.4	11.38	24.46
All	7.39	4.1	40.19	13.31	13.47	21.54
	7.72	3	48.17	11.71	12.42	16.97

Source: SMEF survey of six sectors, 2006/07

Table-1.32: Weighted average capacity utilization in the designer goods industry of Bangladesh

	Products					weighted Average capacity utilization (%)
Farm status	One	Two	Three	Four	Five	
Micro	59	52	22	18	0	51.0
Small	72.72	61.16	51.74	26.23	1.16	64.0
Medium	74.89	72.13	63.19	40.43	12.77	68.0
Large	78.21	73.57	62.86	68.57	18.57	73.0
Mi small	70.99	60	47.97	25.19	1.01	62.0
Melarge	75.66	72.46	63.11	46.89	14.1	69.0
All	73.02	65.43	54.57	34.64	6.71	65.0

Source: SMEF survey of six sectors, 2006/07

1.6 Comprehensive understanding of the marketing chain

Marketing is the business of connecting consumers with manufacturers. This involves transporting a commodity between places, storing it between periods and changing its form to make it fit for human consumption. In all economies, this is a vital function to perform efficiently, ie. At least possible resource costs. Economies, and markets, differ in terms of how well the marketing function is performed. Marketing is efficiently performed when the marketing agents charge keen rates for the use of their resources---time, money, skills, vehicles or fixtures, assets, godowns and risk-bearing---and earn competitive profites. The consumer pays a price that is deemed closely related to the resource costs of supplying to him the commodity in the quantity and at the place and time desired. The manufacturer receives a price that keenly compensates him for the use of the resources up to that stage of production. Understanding how competitively a market performs involves looking at the costs of and normal returns to marketing. On the cost side, we look at the cost of production, and at the cost of spatial arbitrage and at the cost of marketing. Finally, we look at the wholesale and retail margins of benchmark versions of products produced by sample observations covered by us in the survey.

1.6.1 Cost of production

Table xx below report s on the average cost of production of five major categories of products that are produced by the establishments in the designer goods industry of Bangladesh, namely, designer sarees, running yardage, tunics, *fatua* and women's three-in-one.

Table 1.33: Average cost of production of final produce in designer goods industry of Bangladesh

(Taka per unit)

	Cost of production per establishment (Tk. 000s)	Physical output, in homogeneous units (000s)	Cost of production per unit of output (Tk).
Micro	653.1	643.63	1150.7
Small	4283.7	5459.8	1574.3
Medium	11864.6	11449.8	1923.2
Large	51169.1	38398.2	2152.5
MiSmall	4038.4	5134.4	1545.7
MeLarge	21846.7	18293.8	1981.4
All firms	12227.6	11185.8	1746.1

Source: SMEF survey of six sectors, 2006/07

Before proceeding any further, we have to note that these average costs of production cover a relatively large collection of products. These averages in the table are weighted averages, arrived at by dividing average outlay per establishment across size classes by the corresponding average physical volume of production. . Cost of production of micro establishments in the sample is Tk. 1150.7, as opposed to Tk. 1574.3 for small establishments. Likewise, the cost of production of medium establishments is Tk. 1923.2, *versus* as opposed to Tk. 2152.5 for large establishments.

The typical saree construction happens to 80/2 for the warp, 74 for the weft. Superfine running yardage from Saiham Textiles Mills is often the fabric of choice. It is astonishing how wide a range of quality, aesthetical arrangements, crocheting, embroidering, hemming, and other attire-making toolery can go into a mere five to six yards of fabric, ultimately turning the prosaic piece of cloth not merely into an utilitarian wear but also into nearly a work of art. It is this diversity that gives sarees the astonishing range in their prices.

We find a difference among the four size-classes of firms in terms of the unit production cost that is statistically very significant. Indeed, unit price on average monotonically goes up as one goes across the size class of establishments. This is largely because, for three-in-one's and sarees at any rate, yarn and the cost of dyes account for the largest combined percentage of the total cost of production, and because not all classes of establishments can buy equally advantageously in both set of markets. Differences among various size-classes in terms of the monthly wage rates too are also all that different.

Naturally enough, retail prices differ very significantly among various size classes. Medium and large (MeLarge) firms significantly outprice micro and small (MiSmall) establishments. And this is consistently true whether one is looking at the sarees or the ladies' 3-in-1 products, or the mens' tunics. Clearly, the MeLarge establishments are selling things on a premium, compared to MiSmall establishments. This means that the marketing margin systematically differ between small establishments, and their 'comparators' across the small-large divide. And one of the more abiding images of this crop of research results is about the divergence between the small and non-small establishments. 7
The following table reports on the marketing margin among the establishments on our sample. Marketing margin for the establishments as a whole is defined as follows:

$$Mi = \frac{(\mathrm{Pr} - Pm)}{Pm} * 100$$

Where M happens to be the sector-specific market margin, Pr is the average price at the retail level, Pm is the *ex-factory* price.

We find that marketing margin in the designer goods sector is 56.1%. It was not possible to determine the marketing margins for micro, small, medium and large firms separately. This was largely because the traders were not able to tell products from say small firms apart from medium or large firms.

Table 1.34: Average ex-factory prices of five major categories of final produce in designer goods industry of Bangladesh (Taka per unit)

Average price of different products			
Farm status	**3-pcs**	**Punjabi**	**Saree**
Micro	1500.0	0	425.55
Small	440.0	232.68	198.58
Medium	216.4	959.21	172.89
Large	440.3	431.37	539.64
Mi small	970.0	232.68	201.78
Melarge	311.2	491.47	385.73
All	649.2	482.88	315.06

Source: SMEF survey of six sectors, 2006/07

The foregoing table shows that, on an average, these three flagship products of the designer goods industry retail, respectively, at Tk. 649, 482 and 315 .

1.6.2 Decomposing the relative importance of exports *versus* domestic marketing

The following table presents an information concerning the comparative reliance of the sample establishments upon domestic sales versus exports.

Table 1.35: Comparative prominence of export-oriented versus domestically-marketed goods in the designer goods industry (Per cent)

Firm size class	% of revenue derived from		
	Sales domestically	Exports	Total
Micro	16.67	83.33	100
Small	40.31	59.69	100
Medium	53.14	46.86	100
Large	39.25	60.75	100
MiSmall	38.31	61.69	100
MeLarge	49.37	50.63	100
All firms	43.33	56.67	100

Source: SMEF survey of six sectors, 2006/07

Overall, fifty-seven percent of the revenue in this industry are generated from exporting, and the residual of 43% are generated from domestic sales. That said, the survey found a statistically significant difference between MiSmall and MeLarge establishments in terms of the exposure to the export markets---61.7% *versus* 50.6%.

Table 1.36: Number of principal customers buying from sample observations in the designer goods industry

Firm size class	No. of principal customers	Of exports			Average unit price of exports ($ US)
		% exported directly, by oneself	% exported through others	% exported unofficially	
Micro	4.0	100.0	0	0	0.02
Small	8.1	45.3	46.6	8	0.79
Medium	11.2	41.4	41.0	17.6	2.33
Large	7.0	46.2	53.8	0	3.25
MiSmall	8.0	47.3	45.0	7.7	0.77

Firm size class	No. of principal customers	Of exports			Average unit price of exports ($ US)
		% exported directly, by oneself	% exported through others	% exported unofficially	
MeLarge	10.2	39.2	43.1	17.6	2.53
All firms	9.1	44.2	44.1	11.6	1.63

Source: SMEF survey of six sectors, 2006/07

The tab le shows that average number of principal customers per establishment on this sample is 9.1. There isn't a whole lot of difference between MiSmall and MeLarge establishments in terms of the number of principal customers. As well, own-account exports and exporting through one's agents split on a 44:44 basis. We also find that some 11.6% of the exports are effected using the so-called 'unofficial' channels.

1.6.3 Reliance on own sales outlets *versus* distributors *versus* commissioned sales agents

The following subsection secures an explanation of the different degrees of marketing strategies of the sample observations based on comparing their reliance on each or all of the three alternative options cited in the foregoing.

Indeed, MeLarge players derive a much greater proportion of their revenue from having their own sales outlets. Whereas the MeLarge players derive as much as 75% of their revenue from their own sales outlets, the same is true for only 35% of their revenues for the MiSmall players. The MeLarge players don't have almost anything to do with the wholesale and retain channels at all, the MiSmall players have a great deal of connection with the wholesaler-retailer channels. The intuition behind this result is self-evident. The MeLarge players are better capitalized, and therefore abler to afford the very sizeable down-payments necessary to be made preparatory to acquiring commercial space in swanky locations in the city. Several of the upscale design houses boast at least one direct sales outlet in the most posh section of Dhaka. And yet the down-payment for one such location can be forbiddingly expensive. For instance, one player on our sample, that has a 300 sq.-ft. direct sales outlet in Gulshan since 2000, has had to front-load by paying a down-payment of the equivalent of some US $ 50000. The rental rate of this property is Tk. 45 per sq.-ft. Clearly, this is among the priciest real estate of Dhaka, and renting commercial property here is not for the faint-hearted. That said, marketing space in such swanky parts of town self-selects some of the most 'trigger-happy' buyers of design and fashion statements in town too. These customers, typically from the wealthiest and trendiest households of the city of Dhaka spend on clothes, antics, and what have you with gay abandon. No price tickets are too daunting for them. Their first loyalty is to sty stylishness, and their second loyalty is to the quality, and their third loyalty is responding to peer pressure. Although it was not possible to do exit surveys of the customers at these direct sales outlets, it is nonetheless reasonable to assume that these spendthrift customers are the captive buyers that sustain such juicy market margins being reported by the MeLarge establishments. These players account for a disproportionate share of the marketing outlets in this sample. This also means that the average buying power of the market catchment area for this MeLarge class of enterprises is far higher compared with the MiSmall players in the industry. Therefore, one strong result of this has been that the MeLarge players are distinguished by the far higher average buying power of their typically batch of clients. What policy lesson are we to take from this? There really isn't a whole lot of policy change that hinges on this. Perhaps for the activist women-entrepreneurship enthusiast, this finding could well become the trigger for a movement. This movement could demand that the SME Foundation ought to consider acquiring/leasing 'display centers' in swanky parts of the major markets (especially Dhaka and Chittagong), which to then sub-lease to 'up-and-coming' MiSmall establishments from outside Dhaka and Chittagong. This would be a fine example of the SMEF fostering inclusiveness. There will be a need for the SMEF to work closely together on this with BWCCI, CWCCI and the WEAB. We include this 'recommendation' in our slate of recommendations included towards the end of this sector report. But we place it as of relatively LOWER priority compared with other more urgently-needed including capacity-building measured that we recommend.

The marketing margin for MeLarge players is also larger compared with MiSmall players because of yet another reason. And that reason is about the fact that the former makes an effort to produce goods representing on average a better-quality product. The clear evidence for this can be had from examining the unit prices of the goods they sell. The average prices of their goods is clearly statistically significant and higher compared with MiSmall players' average prices.

MiSmall players appear to be confined to using the services only of the traditional, top-down marketing network approach. That is, they most use the market channels of wholesalers and retailers. And being dependent upon this traditional market channels translates into having to depend upon channels that demand a great deal of trade credits to be provided.

Table 1.37: Market channels for domestic sales in the designer goods industry (Per cent)

Firm size class	% sold domestically through wholesalers	% sold domestically through own outlets	% sold domestically through agents	% sold domestically through others	Average price (Tk.)
Micro	46.7	20	0	33.3	1068.7
Small	35.3	24.7	10.8	29.2	806.8
Medium	25.6	48.9	5.4	20	633.6
Large	31.2	48.5	4.8	15.5	662.4
MiSmal	36.8	24.1	9.4	29.7	842.6
MeLarg	27.4	48.8	5.2	18.6	642.0
All firms	32.9	34.4	7.7	25.1	759.6

Source: SMEF survey of six sectors, 2006/07

Table 1.39 reports results about the pattern of domestic marketing using various market channels. Overall, 'own outlets' is the marketing channel of choice, and accounts for 34.4% of all output domestically marketed. Overall, the next most important market channel happen to be 'the marketing through miscellaneous channels'. Important differences however lie behind these 'average' figures. The percentage of domestic output marketed using own-outlets of the MeLarge establishments relative to MiSmall split almost on a two to one ratio. The obverse of this is that the MiSmall establishments out-depend the MeLarge establishments by about 10 percentage points when it comes to relying upon wholesalers. And this result is perfectly intuitive: opening own outlets are not within everybody's wherewithals, or capacities. Typically, opening one's own outlets requires a good deal of additional capital. We have already seen that access to finance involves certain egregious asymmetries across the MiSmall *versus* MeLarge class of establishments. And having a secure line of credit is of critical importance when it comes to determining whether a firm feels bold enough to launch into own-account marketing. The MiSmall establishments are much deeply capitalized compared with MeLarge, and therefore rely proportionately much less upon direct outlets. Instead, they depend more upon wholesalers.

MeLarge establishments depend more on own-account outlets in order to build their own customer-service brand loyalty. It is not always prudent to depend upon wholesalers building brand loyalty is one's objective. A second reason why manufacturers are not really enamoured of wholesellers is that the latter demand --- and get ---suppliers' credit. Table 1.39 presents results relating to the terms and conditions under which wholesalers do their business with manufacturers. Several results rate a mention here. Firstly, suppliers' credit has to be provided on more than three-fifths of the manufacturing throughput passing through wholesalers. Nor are the payments of the wholesalers are impeccable: at the years' end, as much as 16-17% of the disbursements to wholesalers remained unpaid, due to be collected. On an average, manufacturers are owned a large verage sum of Tk. 855 thousand. Small wonder, MeLarge firms are migrating out of the orbit of the commercial influence of their wholesalers.

Table 1.38: Wholesaling market channels in the designer goods industry (Per cent)

Farm status	Total wholesaler	% sold credit	Period of credit	% more for credit	% unpaid	Recent Unpaid
Micro	5.33	76.67	190	4	5.5	906.67
Small	6.5	66	238.33	5.11	16.81	304.38
Medium	11.83	45	300.83	5	19.4	983.33
Large	9.67	40	210	5	16.67	600
Mi small	6.33	67.6	230.28	4.5	15.56	399.47
Melarge	11.11	43.33	270.56	5	18.38	855.56
All	7.77	60.07	243.7	4.66	16.42	546.07

Source: SMEF survey of six sectors, 2006/07

Table 1.39: Direct sales outlets channels in the designer goods industry (Per cent)

Farm status	Total sales Outlet	Employees No.	Adminstrative cost	Wages	% Rejected	Loss for Rejection
Micro	1	2	7	10	1	10
Small	2.62	3.46	17.15	8.23	5.31	40.38
Medium	3.29	17.14	338.7	14.17	2.36	47.85
Large	4.44	18.67	49.04	11.55	3.67	116.66
Mi small	2.5	3.36	16.42	8.35	5	38.21
Melarge	3.74	17.74	261.75	13.15	2.87	74.78
All	3.27	12.3	128.6	11.34	3.68	60.94

Source: SMEF survey of six sectors, 2006/07

Table 1.41 shows several things. Firstly, overall firms in the designer goods industry man 3.27 own-account sales outlets. MeLarge establishments out-retain MiSmall establishments by a factor of almost 50%---3.74 outlets *versus* 2.50. Secondly, the average size of a direct sales outlet maintained by the MeLarge establishments in terms of the number of workers per sales outlet is more than three times as large as compared with MiSmall establishments (4.74 *versus* 1.34 workers hired per sales outlet).

Tables 41 and 42 are about the economics of the commissioned agents and about the terms under which manufacturers' transactions with them take place.

Table 1.40: Commissioned agents' channels in the designer goods industry (Per cent)

Farm status	Total Agent	Total wages	Per head Com.	Total Com.	% rejected	Loss for Rejection
Micro	0	0	0	0	0	0
Small	7	10	11.67	0	3.33	15
Medium	15	0	10	0	5	0
Large	4	0	7.5	6	0	0
Mi small	7	10	11.67	0	3.33	15
Melarge	7.67	0	38.33	6	1.67	0
All	7.33	6	25	3	2.5	9

Source: SMEF survey of six sectors, 2006/07

1.7 The drivers of unit costs of production

Unit costs are defined as the total cost of production divided by the rate of the establishment's output. The following budget line items have been added up while getting at total cost of production:

Cost of raw materials;
Cost of other materials (such as fuel, lubricants, dyes and chemicals, packing materials)
Spares parts, and cost of preparing moulds etc.
Repair and maintenance, etc
Financing costs
Office supplies
Communication, storage, and transportations
Wages and salaries
All kinds of utility expenses
Advertizement expenses
Marketing outlay
Rentals of various kinds
Commercial expenses arising in connection with foreign trade
Miscellaneous expenses

Table 1.41: Cost of production per establishment in the designer goods industry (Tk.000s)

Firm size class	Raw materials costs	Parts & components, repair & maintenance	Wages	Other expenses	Total cost of production	Overall cost of production per unit of output (Tk)
Micro	709.85	9.83	632	403.63	1755.31	1150.7
Small	2423.36	73.59	1318.87	919.86	4735.68	1574.3
Medium	5545.31	169.98	3295.33	3761.57	12772.19	1923.2
Large	42024.08	115	30420.47	6337.41	78896.96	2152.5
MiSmall	2288.08	68.55	1264.64	879.1	4500.37	1545.7
MeLarge	15234.99	155.38	10500.44	4445.78	30336.59	1981.4
All firms	8206.67	108.24	5486.72	2509.58	16311.21	1746.1

Source: SMEF survey of six sectors, 2006/07

Table 1.42: Cost of production per establishment in the designer goods industry by narrower categories (Tk.000s)

Farm Status	Raw materials cost	Maintenance	Interest Price	All types of utility	Wage cost	Ad/Marketing	Rental cost	Commercial cost	Total
Micro	717.35	11.5	7.17	42.53	632	232.77	35	77	1755.32
Small	2512.37	101.39	82.59	143.59	1318.87	197.73	331.69	47.46	4735.69
Medium	6906.27	214.23	238.17	515.71	3295.33	492.96	995.79	113.72	12772.18
Large	42230.55	325	81.12	4199.88	30420.47	900.06	476.94	262.94	78896.96
Mi small	2370.66	94.29	76.63	135.61	1264.64	200.49	308.27	49.79	4500.38
Melarge	16289.28	243.66	196.45	1494.32	10500.44	601.09	857.97	153.36	30336.57
All	8733.46	162.57	131.41	756.74	5486.72	383.62	559.56	97.14	16311.22

Source: SMEF survey of six sectors, 2006/07

Table 1.43: The Structure of costs in Bangladesh's Designer goods ndustry, 2006/2007

Farm Status	% of total cost								
	Raw materials cost	Maintenance	Interest Price	All types of utility	Wage cost	Ad/Marketing	Rental cost	Commercial cost	Total
Micro	40.87	0.66	0.41	2.42	36	13.26	1.99	4.39	100
Small	53.05	2.14	1.74	3.03	27.85	4.18	7	1	100
Medium	54.07	1.68	1.86	4.04	25.8	3.86	7.8	0.89	100
Large	53.53	0.41	0.1	5.32	38.56	1.14	0.6	0.33	100
Mi small	52.68	2.1	1.7	3.01	28.1	4.45	6.85	1.11	100
Melarge	53.7	0.8	0.65	4.93	34.61	1.98	2.83	0.51	100
All	53.54	1	0.81	4.64	33.64	2.35	3.43	0.6	100

Source: SMEF survey of six sectors, 2006/07

Table 1.44 reports costs of production per establishment across the firm size classes. In the last column, the table also then reports on average cost of production. The average cost of production is clearly a monotonically rising function across the four size classes of the establishments in this industry.

1.7.1 Fitting Cost Functions in the Designer Goods Industry of Bangladesh

Policy-making for pro-poor growth will often put a premium on being able to understand the drivers of unit costs. The point here to note is that cost competitiveness is good for competitive performance. And that being able to lower one's average costs is good for one's survival in the long run. As well, unit costs are the metric that everyone, especially including the competitors in the emerging industrial powerhouses in the Asia region, watches intently. Especially in China and India, the world's largest manufacturing juggernauts are amassing latest technologies, skills and computer-aided manufacturing gadgetries, helping such countries become ready receptors of the massive surge in demand for their products which are now in the process of being unleashed. Therefore, aggressive monitoring and mentoring of costs is imperative if firms have any ambition at all for survival, and growth, in a feverishly competitive 'global village' that the world of commerce and industry have managed to become in the last four decades.

Competitive cost analysis is important for a number of reasons. While financial accountants concern themselves mainly with elements of costs --- and this concern is also importantly shared by the management --- it is however the cost drivers that are of far greater operational significance. The literature suggests that cost drivers essentially fall into four categories, and they are (i) design-related costs; (ii) facility-related costs; (iii) geography-related costs; and finally (iv) operation-related costs. Before proceeding any further, it is moot to enter just a few sentences each with respect to each of these four categories of cost drivers.

Design-related cost drivers: Because a product owes itself to a design process, it is imperative to get the design-related costs of alternative specifications right. This is necessary so that an apples-to-apples comparison is possible among alternative product designs that offer comparable functionalities. It is important in doing to start off from an well-agreed definition of what is the goal of the design process. We mean to say that the same set of functionalities can be achieved with or without offering *additional desirable capabilities*. Such design-stage add-ons will always come on with cost additionally.
Facility-related cost drivers: Some production technologies are such that it is advantageous to scale their output up, because larger scales of output ensue economies of scale, which smaller scales of output don't. This consideration makes it imperative to treat the scale of output, or the technologically-determined size of the plant a facility-related cost driver that we need to model the effect of. As well, at times, the economies of scale are not so much technologically datum as the derivative of some economic incentives, for instance the fact that volume discounts may be available on input purchases, and that large scales of output are associated with large volumes of input purchases. That is, there are economies of procurement and marketing. If used or rented equipment are cost-effective relative to new equipment, the recycling of used or rented equipment is a desirable cost driver. If frequent power outages render investment on large capacity electricity generators cost-effective, the shrewdness in the process of locating the least-cost generation technology is likely a positive cost driver.

Geography-related cost drivers: Spatial pockets of relatively high wages, or high input prices exist in every country. Rental rates are relatively high in certain clusters than in others. The down-payments that need to be made in the swankiest parts of the city in order to lease 'showroom' or 'display centers' tend to be much higher than in boorish parts of town. The point is that geography can be destiny in certain kinds of businesses. And yet geography can be an important competitive cost motivator.

Operation-related cost drivers: It is increasingly recognized that manufacturing operations can be more or less mean. Japanese manufacturing has famously introduced lean manufacturing, or the just-in-time (JIT) manufacturing. The extent of specialized training of the Managing Director will be an operational cost driver, as will whether the establishment is located on or near the all-weather highway. As well, the ratio of the number of production workers to the number of mid-level supervisory and managerial workers will also shape up as yet another operational cost driver. Moreover, percentage reliance of the establishment on imported raw materials (to be evaluated using the ratio of imported parts and components in the total outlay on raw materials) will be utilized as yet another operational cost driver.

The really important question is what are the drivers of the unit cost of production. To answer that question, we shall need to consider a number of competitive cost drivers.

The most basic form of the cost function is the one in which the unit cost is simply modeled as a function of the rate of output. At times, in order to test for any non-linearity in the cost surface, a quadratic terms is also typically factored in. Sometimes, even a cubic term is also introduced into such a cost equation. Under these circumstances, the cost function has the following appearance:

$$Ln© = c_0 + c_1*ln(Q)+ c_2*ln^2Q + c_3\,ln^3\,(Q) + c_i\,\Sigma\,X_i$$

Where C = Average cost of production

Q = The rate of output

c_0, c_1, c_2 and c_3 are coefficients of the cost function to be estimated;

'ln' is the code of natural log;

and X is a matrix of a number of explanatory, shifter, variables.

Such a model can only be reasonably applied to the data provided it is certain that the output of the study establishments is homogeneously measured.

Table 1.45 presents the coefficients of the logarithmic cost function that we have estimated. The following findings are highlighted by the numbers. Firstly, we find that the underlying cost surface is like a whip-saw in the log-log space, in this industry. The coefficient of the log-linear segment is positive and highly significant. This means that as scale of output rises early on, unit cost declines significantly, as, for instance, machines are 'run in', workers run up the learning curve. As a result of both factors, raw material wastage tends to decline. The log-square term is negative and highly significant too. Over the relevant range of output, this happens because severe diseconomies of scale and scope set in, thus ratcheting unit costs up. The log-cubic term then is negative once again, with its coefficient highly significant. Dummies for micro, small and medium establishments are each highly significant. Because the large establishments provide the control in the specification of these three dummies, the implication is that relative to large establishments, unit costs of micro, small and medium establishments are, given their quality quotients, significantly lower.

Table 1.44: Determinants of logarithmic cost function in the designer goods industry (Regressing natural log of average production cost per unit of output in Taka)

Explanatory variable	Regression coefficient	t-stat
(Constant)	19.88*	11.82
LN_Q	-3.57*	-4.86
LN_Q_2	.37*	3.49
LN_Q_3	-.01*	-2.84
CTG_DUM	-.10	-.48
DHK_DUM	.11	.75
F_D_1	-1.45*	-3.69
F_D_2	-.94*	-4.12
F_D_3	-.65*	-3.09
R^2		0.492

Source: SMEF survey of six sectors, 2006/07

Note: Single asterisk attached to a T-statistic implies that the corresponding regression coefficient is significant at 5% error probability level, and two asterisks imply significance at 10% error probability level.

Knowing that the rate of output drives unit cost, while it is certainly of some pedagogical interest, is not of much policy importance. This is so because the output is itself a composite, and the subject of the combined influence of many a factor of production. It does not single out the role or the importance of any one particular driver that may be of some quantifiable importance to policy makers.

Much has been made in the literature of the fact that capacity utilization be used as a competitive cost driver. This does not however accord very well with econometric principles. Capacity utilization is simply a ratio between the rate of output achieved to some well-formed notion of economic capacity. One reason why this is not all that interesting from the perspective of policy formulation is because in a real sense, this is not all that dissimilar to the foregoing cost function: unit costs are merely functionally dependent upon not so much the measure of output as on a transformation of output. The latter is bound to closely correspond to the output itself. Therefore, this formulation is not interesting for the same reason that the first functional formulation is not interesting.

1.7.2 Fitting a flexible translog cost function to the data

A translog cost surface is often advanced as an appropriate analytical tool to capture the drivers of costs in any industry. Annex-2 presents the analytical model that most researchers apply to the problem. The glossary of the variables used is also presented in Annex 2. All unit data are transformed logarithmically. LnY refers to natural log of the output level; lnP1 refers to natural log of input prices; lnP2 refers to natural log of the wage rate; lnP3 refers to natural log of the interest rate; lnK refers to the natural log of fixed capital on replacement cost basis; $\ln^2 Y$ refers to the square of the natural log of Y. All the remaining terms are interaction terms based on the foregoing variables. The results presented in Table 1.46, are now briefly discussed. First, compared with the cubic cost function, r^2 has risen to 0.73: clearly, the functional form reported in Table 50 is a more accurate description of the cost surface of the sector. Following findings are important. First, if the scale of output increases, total variable cost (TVC) increases, too. Variables costs are increasing in material input prices, and the effect is statistically significant. .

Table 1.45: Determinants of trans-log variable cost function in the designer goods industry

	Coefficient	T-statistics
(Constant)	4.41*	2.23
Ln(Output) (Y)	-0.84*	-2.57
Ln(Input Price) (P1)	0.84*	2.25
Ln(Wage rate) (P2)	1.99*	3.48
Ln(Interest rate) (P3)	0.06	0.78
Ln(Fixed capital) (K)	-.03*	-.19
Ln^2Y	0.28*	9.8
P1_P2	0.05	0.3
P1_P3	0.01	0.76
P2_P3	-.02	-.79
P1_K	-.01	-.33
P2_K	-.01*	.19
P3_K	0.001	.17
P1_Y	-.12*	-3.73
P2_Y	-.2*	-2.27
P3_Y	-.003	-.4
R^2		0.737

Source: SMEF survey of six sectors, 2006/07

1.7.3 Actionable plans for lowering average costs

From a number of studies, we now know that unit costs are powerfully influenced by the rate of output, by capacity utilization, by locational advantage, the relative reliance on imports, and the like. Of this, all three are potentially relevant from the perspective of policy feasibility. For instance, the rate of output can be influenced by fostering greater competitiveness in the markets for or greater access to the capital input, or both. Note that interest rates in Bangladesh which are among the highest in Asia (Chowdhury and Miah, 2006; Chowdhury, 2007) can potentially be lowered using measures that bring about greater competitiveness in the credit markets.[30]

Capacity utilization (CU) is inversely related with unit costs. This implies that measures that positively motivate CU will lower unit costs and thus improve competitive performance of establishments.

Units that are located on the main grid of the roads or within some well-recognized clusters tend to have lower average costs compared with units that are located more inland.

And finally, reliance on imports ramps up costs. This is largely because imports are squeezed for all they can sustain. Bangladesh depends on customs duties on imports for more than 40% of her revenues. Imported inputs are therefore more pricey and expensive compared with inputs that are domestically produced.

We include interventions in the Action Plan (section 4.11 below) that will assist enterprises in the designer goods industry to lower their average costs and thus improve their competitive position in the industry.

Will drawing up of a tactical plan whereby to mitigate each of the competitive gaps in the performance of sample of enterprises form each of these industrials. While the details of this information will be presented in the Action Plan that we include later in this report, suffice it to say for the moment that the following are the principal props of this action plan:

(1) There has to be a certain degree of facilitation by appropriate authorities in the interest of increasing the capacity utilization of the establishments in the industry. Such authorities may include the National Board of Revenue (NBR), the Ministry of Industries, the SME Foundation, the BSTI. Clearly, the taxation policy of the country will have to carry a lot of the burden of rolling back the average costs for industry. Naturally enough, the NBR, as the locus of the design and the implementation of the Government's taxation policies too will also have to become more accountable in terms of rolling back the costs.

(2) Unit cost is merely the observe of the level of factor productivity achieved or, more precisely, of the total factor factor productivity. Anytime factor productivity increases in an industry, the average cost of production in it falls. This recognition makes it imperative to take a close look at the whatever influences the level of factor productivity. Our own analysis suggests that capacity utilization, the rate of output, the age of the capital machinery, the nature and the length of the training by the entrepreneur, the location of the enterprise, are the factors that influence average costs.

[30] Already, the SME Foundation is on the cusp of initiating credit wholesaling in an potentially effective effort to lower the binding interest rates that especially micro and small establishments have to pay while servicing their loans from the banking system.

1.8 The ICT Platform of the designer goods industry

The world is inexorably being transformed by the Information Revolution. Information technology (IT) has profoundly transformed the *modus operandi* for customer satisfaction in businesses. The delivery of government services and its interactions with the governed have changed like never before. Markets, production, storage, marketing, safe-keeping one's money, keeping track of it, even making it, have morphed due to ICTs in ways never before thought possible. In a famous prediction, a pair of American professors, both having trained in software engineering, wrote that by 2010, about a half of the entire US GDP would comprise of output of industries that either mostly produced information-rich output or consumed it (Shapiro and Varian, 1998). The last 15 years have been famously iconoclastic: one epochal markers after another has been rendered obsolete, in a blur of a phenomenal increase in speed at which and the intelligence with which machines, devices and systems---cogs in the machine that the "information economy" has become---compute, store, retrieve and send across information and data (Chowdhury, 2002). Indeed, everyone's conceivable paradigms in computing, communications and connectivity have been shifted so often in the past few years that many have understandably foresworn counting (Chowdhury, 2003).

The positive net contribution total factor productivity, in developed countries is widely accepted. Investment on IT is found to have spurred the total factor productivity growth (TFP) in the US economy.[31] The estimates range from 0.31% annually by Gordon (2000) to a relatively high 1.19% in a study by the Council of Economic Advisors to the US President's Executive Office (CEA 2001). TFP growth due to IT is far greater within the IT-using industries than in the IT-producing industries. That finding is intuitive, in that IT-using industries (such as financial or healthcare industries) are more information-dense in their business processes, which therefore respond more vigorously to IT investment.that investment in information technology (IT) typically makes to the rate of productivity growth, usually measured in terms of

The ascendant paradigm in communications technologies had its origin roughly in the mid-1990s. A World Bank classic, "Telecommunications is dead, long live computer networking" (Bond, 1997) best presents this paradigmatic shift. Telecommunications, powered by "circuit-switching" technologies, were symbiotic with the old and onerous, the obese and the over-centralized. Computer networking, of which the best-known icon is the World Wide Web (WWW), is by contrast programmable and prodigiously powerful, plebian in pricing, lean and forever learning. The differences in economics between the two are simply staggering, with the Web on the cusp of virtually killing off telecommunication as we have known it. Of particular significance is the centrality of open standards, greater accessibility and therefore the greater proneness to innovation, the shorter time-to-market, etc. that characterize the 'Net-heads' world compared with the 'Bell-heads'.[32] The WWW has profoundly transformed success drivers in business in rich countries. Businesses, governments, charities, and citizens have flocked to the Web to deal and heal, to learn and leverage, to inform and be informed, to educate and to entertain, to make, safe-keep and spend one's money and so on. Women outnumber men on the Web. And, like with "brick-and-mortar" buying, clothing is the largest draw of online spending. The "online" buying is

[31] Economic growth of nations may stem from factor accumulation (of labor or capital) or from growth in total factor productivity (TFP).
[32] "Bell-heads" are named after the Bell Telephone Company, one of the veritable icons of the tele-communications world.

becoming pretty much like “offline” buying. In short, the WWW is fast becoming the central character in a cast of thousands. A fluent understanding of the Web and technologies and competencies to leverage it has become an essential ingredient of success drivers---of competitiveness--- in the 21st century.

The state and the relevance of the information and communications technology infrastructure that is harnessed by the sample observations is therefore of some interest to us. The following tables present information about these aspects concerning the establishments on our sample. Several findings are worthy of being mentioned. Firstly, the percentage of cases of establishments owning and using personal computers overall is found to be 70%, and of server-grade machines 10%. Similarly, some 45% of the establishments have an internet connection. Significantly, this proportion of internet access is somewhat higher compared with the proportion of cases of establishments that have at least one mobile telephone: forty one percent of the establishments have at least one mobile phone. The proportion of cases where the establishment was found to have at least one fixed telephone line was about 65%, significantly in excess of the corresponding percentage of cases where establishments owned either Internet access or a mobile telephone. This shows that fixed telephone line in this industry still retains an edge when it comes to selecting the mode of people of keeping connected for business or recreation. The reason why this is so is probably because the broadening of the base of the use of the internet is impeded by the lack of Internet bandwidth, for all the rapid rate at which Internet bandwidth provisioning in Bangladesh has grown. Another reason why the penetration of mobile telephony on this sample still lags behind fixed telephony is probably the fact that, for all the bounding growth rate of mobile telephony subscriber base, many areas are not characterized by robust and always-available network connectivity.

Table 16 reports on the average number of personal computers, servers, mobile and fixed telephony connections etc. that the sample has returned per user.[33] Several findings are worth emphasizing here. First, establishments that admitted to owning any personal computers admitted owning an average of 2.42 personal computers. Establishments that admitted to owning any personal computers admitted owning an average of 1 server-grade computers. Establishments that admitted to owning an access to the Internet admitted paying for an average of 42 Kbps of access to Internet bandwidth. Establishments that admitted to owning any mobile admitted owning an average of 3.84 mobile telephones. Establishments that admitted to owning any fixed telephone admitted owning an average of 1.84 fixed-line telephones. Establishments that admitted to owning any business automation software admitted owning an average of 1.75 software of that nature.

Table 1.46: Profiles of the penetration of information and communications technology into Designer Goods Industry, Bangladesh

Farm status	ICT						
	% of establishments with						
	At least one personal computer	At least one server	At least one Internet connection	Band width	At least one No. of mobile phone	At least one fixed telephone line	No. of Business automation soft.

[33] These are averages. These averages are calculated based only on respondents that own any or all of the ICT devices cited in the previous discussion. Cases returning zeroes, while perfectly valid for other computations, have been omitted from the calculations surrounding Table 1.47.

Micro	40	20	30	10	30	40	10
Small	65.2	7.2	34.8	8.7	31.9	63.77	10.14
Medium	83.0	8.5	57.4	21.3	46.8	74.47	14.89
Large	71.4	21.4	64.3	0	71.4	64.29	14.29
Mismall	62.0	8.9	34.2	8.9	31.6	60.76	10.13
Melarge	80.3	11.5	59.0	16.4	52.5	72.13	14.75
All	70	10	45	12.1	40.71	65.71	12.14

Source: SMEF survey of six sectors, 2006/07

Table4.47: Profiles of the penetration of information and communications technology into Designer Goods Industry, Bangladesh

	Average Use of computer, software and Internet					
Farm status	**No. of personal computers**	**No. of servers**	**Bandwidth**	**No. of mobile phone**	**No. of T&T**	**No. of Business automation soft.**
Micro	2	0	25	4.67	1.75	0
Small	1.7	0	43.5	1.73	1.34	1.86
Medium	2.77	1	42.6	4.95	2.17	1.57
Large	4.6	1	0	5.8	3	2
Mi small	1.72	0	40.86	2.08	1.38	1.86
Melarge	3.14	1	42.6	5.22	2.34	1.67
All	2.42	1	41.88	3.84	1.84	1.75

Source: SMEF survey of six sectors, 2006/07

1.9 Management Hierarchy

Table 1.49 is about management hierarchy. Taxonomically, 'flat' versus 'hierarchical' management structures are really the two polar divides that come to mind. The two terms are not necessarily unambiguously defined in the literature. Lay people would understand by flat management structure a rather loose, informal, fluid structure in which canons regarding relationships between tasks and briefs, chain of command and accountability, even rewards and rebukes, are not formalized. Such informality is frequently the mantle of micro and small, at times even medium-sized, enterprises. Hierarchical management structures however set much larger store by codification and formalization, documentation and processes. Such processes are often written into business rules that get codified into the working of human resources software that get written so as to enforce such hierarchy in as much an impersonal manner as possible.

Respondents were asked to assess if their own management structures were flat in some 'general' manner. Their responses have been tabulated in Table 17 below. Several findings stand out. First, a full 70.7% of the sample respondents consider their own management model as being 'flat' in nature, while another 29 % think theirs are a hierarchical management model. That said, secondly, important difference emerge between MiSmall and MeLarge establishments. Whereas as much as 83% of the sample establishments consider themselves to have 'flat' management structures, the corresponding percentage for the MeLarge establishments is only 56%.

Table 1.48: Profiles of the management structure in Designer Goods Industry, Bangladesh

	Units having a flat Mgmt structure		Units having a hierarchical Mgmt structure		All	
	No.	% of total	No.	% of total	No.	% of total
Micro	6	100	0	0	6	100
Small	57	81.4	13	18.5	70	100
Medium	23	48.9	24	51.1	47	100
Large	13	76.5	4	23.5	17	100
MiSmall	63	82.8	13	17.7	76	100
MeLarge	36	56.2	28	43.8	64	100
All	99	70.7	41	29.3	140	100

Source: SMEF survey of six sectors, 2006/07

1.10 Towards the formulation of growth strategy

The next topic is about growth strategy. But before we take growth strategy up, we have to remind ourselves that growth will need to be pro-poor. In a pro-poor scheme of things, we need to grasp, with some real accuracy, the process whereby the ‘demand’ for labour and capital drive themselves at the levels of the firms that comprise the world of manufacturing. After all, it is these drivers of factor demand in general, and of labour in particular that any growth strategy will need ultimately to be about. We therefore have invoked a full-information model so as to estimate a system of ‘input demand functions’. The factors or inputs considered are labour, fixed capital and material inputs. The following is the structure of the model. In order to estimate this system of equations, we employ Zellner’s Seemingly Unrelated Regression Estimators (SURE). This estimator is the most appropriate when the disturbance term are correlated across the equations comprising a system of equation of the kind to be introduced in the appendix to this report. It is quite appropriate to say that it is in the determination of the labour demand and capital demand that we are most interested.

Labour demand:

We find that the labour demand function is negatively sloped in wage rate (lnW), which is what it should be. The regression coefficient is statistically highly significant.[34] We find that the labour demand function is positively sloped in product price (lnP), which is what it should be. The regression coefficient is statistically highly significant. We also find that the labour demand function is positively sloped in fixed capital (lnK), which is what it should be. The regression coefficient is statistically highly significant. We find that the labour demand function is negatively sloped in the dummy variable relating to automation (D_a), which is what it should be. The regression coefficient is statistically highly significant. The upshot is that this estimate of the labour demand equation is quite intuitive. It says that in order to stimulate the demand of labour by the establishments in the industry, efforts have to be made in order to lower the reservation price of labour. Reservation price is about the minimum opportunity cost that is consistent with the worker being able to reproduce its labour-selling power and thus deciding to supply labour. Essentially, reservation price revolves around workers’ cost-of-living. Clearly, there is a lot that public policy can do about workers’ cost of living. Foremost among them is about leveraging the cost of food as a policy variable.

[34] Note that with SURE, it is z-statistics, rather than t-statistics, that is calculated in order to assess statistical significance of individual regression coefficients.

Secondly, we find that the amount of labour that entrepreneurs demand is a positive function of the average product price they can charge. The higher the average product price, the more labour they tend to generate. Now product price is about the quality and the design of the product, its workmanship, the use of more expensive, more attractive and yet more user-friendly packaging material for the product. Ultimately, this is about the amount of industrial knowledge that goes into the product. Our results show that the higher is quotient of the application of knowledge embodied in the product, the larger is its knock-on effects on the demand for labour that it creates.

Thirdly, the amount of fixed capital that an enterprise has to work with also positively drives its need for worker. This implies that there is also a need, in the interest of spurring pro-poor growth, to increase the capital provisioning especially of MiSmall establishments. Such enhanced capital provisioning would energize their demand for labour, and would be good news for pro-poor growth.

Fourthly, the automation dummy has a negative and statistically highly significant coefficient. The higher is the index for automation, the lower is the demand for labour. There are times when entrepreneurs automate their business processes not necessarily because such automation is ultimately good for cash-gains but because everybody else is doing it too. That is, sometimes, automation can be copy-cat automation. And now we see that automation hurts the cause of human workers. There is therefore a need for programmes that increase the awareness of employers about the pernicious effects of automation in the workplace from the perspectives of pro-poor growth and therefore of 'corporate social responsibility'. This connection is easily worth the creation of a project which centers around the dissemination of greater managerial awareness about the antithetical effects of automation 'policies' that might be pursued by the management, and the livelihood compulsions of average blue-collar workers.

The Demand for Capital

We find that the capital demand function is positively sloped in interest rates (lnI). Given that, as conventional wisdom would have it, credit rationing may well pervade the credit markets in Bangladesh, this result, which is *prima facie*, counter-intuitive, is ultimately sensible. This is saying in effect that the credit market is supply constrained, and that in order to obtain more credit, or to obtain a larger-sized credit contract, you will need to up the ante---by promising to raise the interest rate that you agree to service. This is a typical result of the presence of rationing in the market. We find that the capital demand function is positively sloped in product price (lnP), which is what it should be. The regression coefficient is statistically highly significant. We find that the capital demand function is positively sloped in the dummy variable relating to automation (D_a), which is what it should be. The regression coefficient is statistically highly significant. After all, firms need access to larger amounts of capital in order to move up the automation scale. The upshot is that this estimate of the capital demand equation is quite intuitive. It says that in order to stimulate the demand of capital' by the establishments in the industry, efforts have to be made in order to lower the prevailing interest rate so that access to capital becomes more and more affordable. Clearly, there is a lot that public policy can do about interest rates. Foremost among them is about empowering public-private partnerships (PPP) such as the Small and Medium Enterprise Foundation (SMEF) credit wholesaling programmes, and things like that.

Table 1.49: Towards the drivers of a growth strategy for Designer Goods Industry, Bangladesh

Explanatory variables	Regression coefficient	z-statistics
Labour demand equation		
Constant term	1.46*	2.9
ln(W)	-0.213*	-2.54
ln(P)	0.196*	2.09
ln(K)	0.108*	2.82
Ln(out)	0.295*	5.26
Dummy for automation	-.425*	-2.19
Dummy for Chittagong	-.005	-0.03
Capital demand equation		
Constant term	2.95*	2.96
ln(i)	0.021	0.96
ln(P)	.402*	2.01
Ln(out)	0.393*	3.43
Dummy for automation	1.941*	4.98
Dummy for Chittagong	-0.232	-.60
Material input demand equation		
Constant term	3.37*	2.24
ln(PI)	.48*	4.34
Ln(out)	0.28**	1.71
Dummy for automation	-.51	-.88
Dummy for Chittagong	.83	1.44

Source: SMEF survey of six sectors, 2006/07

1.10.1 The achievement of growth on the sample

We measured the extent of growth using four variables, namely, employment, equity, revenue and number of machines. Using the following formula, we calculate compound annual growth rate in each of these variables over the life-cycles of the firm for each of the firms on the sample. We then presented average compound annual growth rates across firm size classes. The formula is:

$R_i = \exp((\ln(E_t)-\ln(E_0))/n)-1$, where R is the growth rate, E_t is headcount in study year, E_0 is headcount in start-up year, n is the number of years of firm's life since start-up, exp is code for exponentiation, and 'i' is an index at firm-level.

Table 1.50: Average compound annual growth rate achieved by firms in designer goods industry over their lives

Firm class Status	Growth of selected variables per year over the life of firms in….			
	Employment growth	Machine growth	Equity growth	Revenue growth
Micro	10.92	12.18	26.87	22.33
Small	23.33	14.88	28.43	29.26
Medium	27.48	15.11	33.25	29.85
Large	31.77	18.11	36.88	32.43
Mi small	18.79	14.47	24.19	28.21
Melarge	27.48	15.11	33.25	32.22
All	22.79	14.76	28.36	30.04

Source: SMEF survey of six sectors, 2006/07

Table 1.52 presents some idea about what drives the growth process in this industry. Data have been pooled across the firm size classes. The table has three panel of results. The first is where firm level compound growth rate in employment size per year is the dependent variable. The second is where firm level compound growth rate annually in equity is the dependent variable. The third is where growth rate in revenue is the dependent variable. Several findings stand out.

First, AGE of the firm everywhere has a negative coefficient in the equations reported, and the coefficient is almost always highly significant. This is true for example of the 'employment growth' equation, as also for the 'equity' growth equation, and also for the 'revenue' growth equation. Like in the labour productivity equation presented several pages before, the implication is worrying, if not entirely unexpected: it says that there is probably a generation gap between the younger firms and old-timers in the industry, with the former out-growing the latter quite handily. Second, the automation dummy variable is also almost everywhere negative and statistically significant: it means that a very high degree of automation and mechanization does not reward the entrepreneur by automatically generating high growth rates.

Table-1.51: Determinants of growth in Selected Variables per year since start-up in designer goods industry

Explanatory variables	Where dependent variable is growth rate in the employment size of the firm	
	Coefficients	t-value
Constant	2.52*	6.06
Automation Dummy	-1.44*	-4.52
Dhk-dummy	0.54*	1.80
Average product price	0.000	0.47
Age	-0.04*	-2.81
Education	-0.02	-1.13
Fixed capital	-0.001	-1.66
R^2	0.212	
Constant	0.836*	15.31
Automation Dummy	-0.08*	-2.98
Dhk-dummy	0.01	0.40
Age	-0.21*	-14.33
Education	-0.01	-0.93

Explanatory variables	Where dependent variable is growth rate in the employment size of the firm	
	Coefficients	t-value
Fixed capital	-0.02*	-2.60
Average product price	-0.01	-0.67
R^2		0.62
Constant	0.69*	15.69
Automation Dummy	-0.01	-0.48
Dhk-dummy	0.000	0.02
Age	-0.19*	-16.11
Education	-0.008	-0.85
Fixed capital	-0.009*	-1.97
Average product price	0.007	0.86
R^2		0.689
Constant	1.423	6.66
Automation Dummy	-0.45*	-2.74
Dhk-dummy	0.00	0.00
Age	-0.03*	-3.88
Education	-0.02**	-1.86
Fixed capital	0.000*	-1.24
Average product price	0.000	0.34
R^2		0.168

Source: SMEF survey of six sectors, 2006/07

1.10.2 Growth strategy in the designer goods industry

Growth strategy is primarily a matter in which development economists are interested. Because growth itself owes to two broad classes of source, a growth strategy will be about activities that channelization of two kinds of resources into the industries of interest. The following is a definition of a growth strategy that we employ in this study:

"A growth strategy is a coherent organization of initiatives, especially by the government and public-private partnership (PPP) sector, that have demonstrably positive effect on both factor accumulation and factor productivity growth in the sector of interest".

There are two keywords in this definition that it is worth drawing particular attention to. First, the initiatives must have a demonstrably positive effect on both factor accumulation and factor productivity growth, based on statistically significant regression coefficients. We shall carry out multivariate regression equations to explain statistical variations in two classes of variables, namely, factor accumulation and factor productivity. Only factors that have statistically significant coefficient in these regressions warrant inclusion in a growth strategy. Quality money and time will potentially be invested in implementing the sector growth strategies that this work will help spawn. It is therefore imperative that the initiatives and interventions that we highlight must pass muster based on rigorous statistical tests involving causalities that are theoretical sound and intuitive.

1.10.3 Towards a Growth strategy for the Designer goods industry

Results from the SURE estimation point up several strategic directions to foster growth in the designer goods industry of a type that spurs the demand for labour. First, policies that work on macroeconomic stability and keep in check inflation rate are important. As well, policies that help in keep relatively low and stable the prices of 'wage goods'---food, clothing, fuel, housing rents, etc---will be needed in order to keep labour's reservation price in check. Secondly, interventions are needed in order to improve access to finance, especially for the MiSmall class of firms. Thirdly, the entrepreneurs need assistance in order to upgrade the quality, turn-around, functionality, etc of their products, as relatively high product price strengthen the demand for labour. Fourthly, naturally anything that is positive for capacity utilization is, via the route of the positive effect of measured output on the demand for labour, also good for the latter.[35]

We also tapped the opinions of our esteemed respondents about their perceptions of which various growth motivators or impediments they would much rather have assistance. We have analyzed their responses. Several findings rate a mention. First, the largest single percentage (20%) of suggestions fingered high bank interest rates as a kind of 'black eye' from which relief is urgently sought by the survey respondents. We can take it that reforming the financial sector is the fourth most important strategic task before the country. Second, about sixteen percent fingered erratic supply of raw material as a drag that needed fixing. Third, about thirteen percent spoke out in favour of government's 'pro-industry' policy-set. About ten percent spoke strongly in favour of relaxing the huge constraint in terms of the supply of electricity to the national grid. This closes our discussion concerning the formulation of a strategy for the growth of the designer goods industry.

Table 1.52: Entrepreneurs' own recommendations that will assist them

Prescriptions	Percent of cases
Reducing interest rates charged by banks	20.4
Uninterrupted supply of raw materials	15.5
Government's 'pro-industry' policy-set	12.6
Uninterrupted power supply	9.7
Increasing buyers/ orders	8.7
Easy loan system	7.8
Political stability	3.9
Arrangement of international fair	2.9
Others	18.5
Total	100

Source: SMEF survey of six sectors, 2006/07

1.10.4 Perceived Impact of the Regulatory Regime in the Designer Goods Industry

Respondents were asked the following question: "Of the following interventions by the Government of Bangladesh in the way of regulatory regime, which one(s) do you consider to be a major impediment from the perspective of the growth prospects of your firm?" The answers obtained from respondents in the designer goods industry have been tabulated, in percentage form, in Table 1.54.[36] Overall, of the four regulatory regime 'intrusions' that receive the most frequent negative billing, as many as three have to do with National Board of Revenue (NBR)---namely, income tax assessment, VAT administration (assessment plus realization), the issue of a Tax Identification Number (TIN). Of course NBR has a very important role to perform as center-piece of the government's resource-mobilization effort. Direct taxes have of course to be assessed, collected, administered: domestic resource mobilization effort is of supreme importance. Surely, the necessity for appropriate taxation

[35] We shall desist from discussing the strategic implications of the SURE results with regard to the other two equations estimated. We leave this to be a pleasant duty of the reader to reach their own conclusions based on those two equations.

[36] Respondents are free to flag more than one regulatory regime 'intrusions' as being sufficiently negative. That is why there is no remit in expecting these percentages to add up any particular number.

will sometimes become a kind of blind spot from the viewpoint of an entrepreneur in any given manufacturing industry. That said, it is of great importance that VAT administration is the second most oft-quoted regulatory 'impediment' to the perceptions of the entrepreneurs. In particular, the percentage fingering VAT as the 'stickiest wicket' is the highest for the micro firms. There is genuinely a major 'miscarriage of competitive justice' in the very high probability of 'double VAT taxation' to the detriment of MiSmall firms. We don't have to go into the details of this 'running sore': for a description, see Chowdhury *et al.* 2005.

Table 1.53: Respondents' perceived impediments arising from regulatory regime

Firm size class	Percentages of firms that finger particular regulatory regime 'intrusion' as a major impediment from the standpoint of their own growth.								
Farm Status	VAT administration	Income tax	Issue of Trade License	Issue of TIN	Environment audit	BSTI audit	Boiler audit	Factories' Act audit	Govt. purchase
Micro	50	50	50	50	0	0	0	0	0
Small	32.86	37.14	28.57	15.71	1.43	0	0	0	0
Medium	34.04	51.06	40.43	21.28	4.26	6.38	0	0	0
Large	11.76	29.41	23.53	11.76	5.88	5.88	5.88	5.88	5.88
Mi small	34.2	38.2	30.3	17.1	1.3	0	0	0	0
Melarge	28.13	45.31	35.94	18.75	4.69	6.25	1.56	1.56	1.56
All	31.43	41.43	32.86	18.57	2.86	2.86	0.71	0.71	0.71

Source: SMEF survey of six sectors, 2006/07

1.11 Tactical Action Plan

It is well to remember that the designer goods industry works on or with six main substrates or raw materials. They are as follows: (i) fabric or any woven or knitted materials; (ii) leather;[37] (iii) various kinds of light-textured metals (such as brass, copper, chromium, and the like); (iv) jute, cotton, straw, wheat or maize stem or any glossy agricultural raw material; (v) marine life-forms (such as shell, etc.); and wood. Increasingly however, tastes and industry's creative muse is embracing forms, art-forms and imagery that require the use of metallic artifacts and accessories. In particular, accessorization has become like a tidal wave. Accessorization Of all these forms, fabrics clearly dominates. To give an example, in the Eid season of 2008, the style craze has been about the use of metallic flowers, artifacts and similar confections on substrates of fabrics, , including especially based on substitutes to brass. Before we lay out the elements of the action plan we have in mind for the designer goods industry of Bangladesh, it is important to remember this.

With rapid growth of the buying power of the upper and middles classes, many countries are eagerly paving the way for the development of the lifestyle brands. In India, the FICCI, has created a forum called Lifestyle Forum to promote luxury goods industry in India with specific interest of encouraging Indian lifestyle brands to emerge. The expectation is that international luxury brands will play a key role for sustainable development of Indian luxury market and simultaneously create a manufacturing hub in India. The Forum would seek networking with, even a measure of representation from global luxury brands, Indian fashion brands, lifestyle products, design houses and bespoke services. FICCI Lifestyle

[37] Fashion and Leather Goods division of the LVMH, the world's largest luxury and fashion company, includes Louis Vuitton, the world's leading luxury brand. Leather is among the choicest conduits of fashion and designer production, marketing and branding.

Forum will focus on the $ 450 million luxury goods and fashion Industry. India is soon moving away from being a backwater to 'handmade-handcrafted in India' becoming solicited in luxury circles. A new lifestyle revival is on the cards in India as FICCI aims to develop the Luxury Goods and Fashion Industry and open dialogue with Industry bodies, fashion and private equity and spur investment for growth of 'India Indigenous Luxury'.

Globalization, acute competition, information technology revolution, and increasing customer sophistication are radically redefining competitive conditions. Globalization and increasing customer sophistication are also radically redefining environmental conditions and opinion climates. In many industries, these environmental challenges are showing the limits to traditional organizational recipes. Organizational theorists maintain that spells of extreme environmental dislocations call for flexible organizational solutions. These are solutions that can adapt to changing needs and circumstances. That said, a review of organizational practices shows that the paths to organizational flexibility are myriad and many. Such diversity need to be factored into the make-up of the ideas and projects that we outline in the action plan that follows here.

1.11.1 Short-run Action(s)[38]

Needs assessment: The fact to remember is that globally luxury, fashion and designers goods is worth more than US $ 160 billion. Luxury fashion has evolved from its European and artisan-based origins into a global, high-tech industry. With Asia abounding with hubs of sizzling growth such as China, India, Viet Nam, where very large segments of the population have enjoyed sustained growth of both incomes and middle-class values, the markets for branded, luxury and life-style goods are growing faster than incomes. After all, these goods are highly income-elastic. There is a concomitant need to re-prioritize the importance of designer and fashion goods industry up one or more notches on the order of policy precedence of the government.

Needs assessment: Among the needs that assessments have shown to be capable of being addressed in the short run also include that of securing a greater networking of the community of Bangladesh's emerging generations of designers and fashion practice connoisseurs into the creative core of the South Asian segment of this increasingly globalizing industry. Towards this end, greater public espousal is needed of the case for greater networking of Bangladeshi community of designers and fashion practice leaders into 'best design practices' in South Asia region.

Needs assessment: Among the needs that assessments have shown to be capable of being addressed in the short run also include that of bringing in from India, Thailand and Indonesia training experts with core competencies in a number of substrates on which design capabilities need to be sharpened. For instance, India is a fertile nursery of competencies for design capabilities customized for fabrics as a substrate. If the goal is to upgrade capacities of work on fabrics, India is a natural destination. But if the goal is to upgrade capacities of work on *batiks*, then trainers need to be brought from Thailand or Indonesia. But if the goal is to upgrade capacities of work on shells, then expertise has to be fetched from Indonesia. In all cases, the need is paramount that technical assistance and capacity building packages that might lead to upgrading of capacities in the most promising substrates be conceived, scoped out, rationalized, designed and implemented. Women, both

[38] By short-run, we mean a design and implementation period of 18 months. Medium term corresponds to a design and implementation period of between 19 and 36 months. Long terms means a design and implementation period of more than 36 months

entrepreneurs and employees, dominate the ranks in the design and fashion industry. Anytime public interventions or public-private partnerships are invoked ostensibly for spurring the dissemination of knowledge, flair, skills, marketing networks to benefit the designer goods industry, it is women entrepreneurs that likely benefit more quickly and more copiously. Anytime women entrepreneurs win, the knock-on benefits tend to include women workers. The larger is the halo of such activities that benefit women selectively, the greater is its appeal to gender equality, which is one of the goals of the Millennium Development Goals.

Needs assessment: Increasing accessorization of luxury and designer goods is an well established empirical fact. It is also true that the pace of product and material innovation abroad in the industries that cater to accessorization trends globally is fairly rapid. China and India, especially China , are fast becoming key sources of accessories. The bottomline is that a great deal of such accessories have to be imported. SMEs in general and MiSmall establishments certainly have the potential of putting to work these opportunities of upgrading the product base. That said, whether they can attain that potential will depend upon whether the anomalies, which have been much cited in the past decade, in the structure of border taxation and in the *modus operandi* of the VAT administration. To reiterate, whenever domestic manufacturers launch into the production of any of these accessories based on imported parts and components, vested interested typically 'pull strings' in the corridors of taxation powers, and succeed in creating what has been called, in India and elsewhere, an 'inverted import duty structure' (Chowdhury *et al.* 2005). In essence, duty structure is inverted when customs duty on a certain finish goods is equal to or less than matched duties on lines of imported parts and components that are (putatively) used by domestic manufacturing firms in competing domestic industries. This is an inversion because according to well-established canon of border taxation, the duties levied should be in direct proportion to the degree of processing embodied by different classes of imports. When such inversion exists, the effective protection rate of import trade becomes significantly larger compared with domestic manufacturing. Such anomalies nip any emerging opportunity for backward linkages based on stimuli from the accessorization of the designer goods industry in the bud: such a 'output diversion' is quite relevant here in that some of the potential casualty no doubt includes SMEs.

Secondly, it has been often mentioned by business people that the VAT administration is fraught with especially the MiSmall establishments being squeezed by 'double VAT impostion'. This problem can easily arise on tiny and small manufacturers who almost never have an Import Permit Certificate (IPC) and thus are walk-in buyers of imported parts and components from commercial importers. The latter almost never issue the former with a 'proof of VAT payment' when the former buy, typically in small quantities, their import requirements. Absent such 'VAT credit documentation', such manufacturers become liable to paying a hefty 15% VAT on the assessed value of their entire production. The component in the price that represents the VAT that was earlier paid by the commercial importers at the border and that is passed on these walk-in buyers simply fall through the crack. The point here is that there is a need to streamline the administration of the VAT systems if Bangladesh's design and fashion goods manufacturers have to benefit from the accessorization opportunities.

Needs Assessment: Bangladesh does not have any center-of-excellence for training in connection with design or fashion. By comparison, India has several high-caliber such centers, in Mumbai, Hyderabad, New Delhi, and now in Bangalore. These Indian centers offers the services of expert trainers on the basis of retainerships which are not onerously high, and which are affordable rates that are within the reach of Bangladeshi groups of stakeholders. During the last several years, as the country branding of Indian has become awesome, these centers have drawn a truly international brand, with trainees spending top dollar and hailing from far and wide in Asia and Africa, have obtained sponsorship or trainee-ship in increasingly larger numbers. The use of computer-aided design is entrenched in these centers, as is the use of more craft-oriented skills such as in corsetry, millinery, embroidery and the like. All such centers are closely related with the seats of higher learning in design and life-style technologies in India, with the trainees with the best potential typically moving on to an advanced university degree in fashion technology. Needs exists for Bangladesh's designers and producers to either make the trip to these design hubs, or for arrangements to be made for expert trainers from these design centers to visit Bangladesh on a commercial basis so as to offer instructor-led training to carefully selected batches of trainees. India's elite National Institute of Fashion Technology (NIFT), which was created in 1987, received close start-up collaboration with New York's world famous Institute of Fashion Technology (http://query.nytimes.com/gst/fullpage.html?res=950DE2D81331F932A15755C0A96F948260&partner=rssnyt&emc=rss).

Needs assessment: Workers in several populous segments of the designer goods industry toil virtually with bare hands. Tools that are used are devices that have existed since the Iron Ages, such as steel blades, knives, and things like that. For instance, the workers in cane-and-bamboo based production use knives to smooth the outward surface of bamboo or cane. Yet machines that can smoothen such surfaces at great speed are available. For instance, it is possible to smoothen bamboo or wooden surfaces using Galambus Scott machines. The use of such mechanical smoothener has an added positive in that it also enhances the gloss of the material. Likewise, Tangail weavers, despite years of great growth by the capitalists who 'front' them, still are caught in the rut of using antiquated pit-loom. Such looms are grotesquely energy-inefficient: they have no means whatever of gain any traction from the motive propulsion provided by the workers hands and feel moving aft and sideways. And yet, improved looms exists. For instance, *chittaranjan* looms which are semi-automated devices, have existed for more than fifty years. There is need for programme that broaded the ownership of semi-automated looms in the 'weaving clusters'.

1.11.1.1 Short-term Action(s)

(1) There is considerable need for the SME Foundation to disseminate, in collaboration with relevant trade bodies such as WEAB, BWCCI, CWCCI, Bangladesh Handicrafts Exporters Association and NASCIB, the size of theaddressable overseas market and also the domestic market for designer and fashion goods. This way, it might perhaps be possible to capture the attention of important policy-makers about the need to re-orient the structure of taxation policies and public expenditure policies commensurately to mitigating the constraints that designer entrepreneurs are being handicapped by.

(2) Considerable need exists for the SME Foundation to organize, in collaboration with relevant trade bodies such as WEAB, BWCCI, CWCCI, Bangladesh Handicrafts Exporters Association and NASCIB more frequent participation by Bangladeshi designers and fashion goods in international product exhibitions in India.

(3) Concrete training programmes should be conceived, scoped out, rationalized, designed and implemented, where carefully selected trainers are brought from India, Thailand, Indonesia with expertize of design and production work on fabrics, *batiks*, shells,

respectively. Funding for such proactive programmes ought to be aggressively sought from the bilateral donors. Additional fundings for them ought also to be sought from the Annual Development Plan (ADP). The SME Foundation would need to strengthen its capacity for project appraisal, as also for the preparation of investment, management and business plan(s) preparatory to the authorship of aggressive proposals that compellingly champion the cause of such public-investment proposals.

(4) The SME Foundation ought to take up with the NBR the following matter. The MiSmall establishments in the designer goods industry ought to be given a waiver from paying the 15% VAT on assessed production value. Instead, these MiSmall firms ought to be assessed for VAT collection at a truncated 1.5% of turnover.

(5) Over the medium term, an Institute of Design Excellence (InDESI) be created in Dhaka under the aegis of the SME Foundation (this will be covered later, in the subsection for Medium term actions.) That said, the ground for the creation of InDESI will be paved by greater network between the SMEF's TESS Wing personnel, and one of India's most icons of high-fashion education. That icon is known as the National Institute of Fashion Technology (NIFT). In the short term, SME Foundation might want to sponsor one of the former NIFT alumni, preferably one speaking Bengali and hailing from West Bengal to come and spend quality time (preferably a month) lecturing under the aegis of the SME Foundation. (Among other benefits, this kind of professional collaboration is a pre-requisite to the spawning of institutional good-will.)

(6) A sector development programme of the designer goods industry must contain provision for selective upgrading of the equipment range in use, especially in the hubs of handloom weaving in areas such as Tangail, Kumarkhali and the like.

1.11.2 Medium-term Action(s)

Because medium term refers to a time frame ranging between 12 months to 36 months, these medium term interventions will tend to be more strategic in their objectives, larger in scale and be more cross-cutting in nature. The areas of impact that offer themselves as naturally suitable are (i) design education; (ii) R & D and Design Creativity Center; (iii) facilitation capabilities (such as material testing, materials R & D, etc); and (iv) networking or linkage initiatives.

1.11.2..1 Design Education

The first ingredient of the medium-term action plan is about the need to enhance the capability of the domestic set of producers and designers in terms of formal education in fashion. This is a gap of yawning size when it comes to understanding what is deficient with Bangladesh's design industry. For all its relative inscrutability, fashion and design has a great deal of *savoir-faire* (know-how) that can be codified and 'taught' and 'demonstrated' in classroom setting. "Luxury is the savoir faire (know-how) of the extraordinary," de Place explains. "It's when a brand consistently exceeds the ordinary. There is no compromise with quality, craftsmanship, distribution and certainly no compromise with the communication," according to De Place, one of Franch's most highly-regarding fashion educator. France's elite fashion school ModArt International offers fashion courses that are accreditted with offering MBA to their students. To ensure Mod'Art's fashion education fit with the current international context, de Place and his committee developed courses offering MBA accreditation and a highly practical content. This includes a specific focus on a dormant breed of artisan skills – such as millinery, costume jewellery, corsetry and embroidery – along with luxury goods management and marketing. There's no shirking of the reality that luxury fashion has evolved from its European and artisan-based origins into a global, high-tech industry. With the impact of ebusiness, corporate takeovers and affordable lines even from luxury heavyweights such as Louis Vuitton, Gucci and Christian Dior, the industry is worth an estimated $USD160 billion annually (2006 Bain and Co).

Likewise, in recent years, France's prestigious Institute of Fashion Modelling (IFM) have teamed up HEC of Paris and with a major university China, such as the Tsinghua SEM in Beijing, to open up what has been called France-China Luxury Management Forum. This has been done in order to systematically penetrate the ranks of China's best young minds with the message that building successful lifestyle brands pays well. Naturally enough, blending and fusing fashion, life-styles, and design capability is the very essence of worldclass design-industry focus.

Of course, Bangladesh has a BGMEA Institute of Fashion Technology (IFT) which offers, among others, a 4-year honours course on Apparel Design. But this is a place where studies are full-time. Course fees are Tk. 350000 for a slot in the 4-years honours track. A year's diploma costs Tk. 92 thousand. The focus is not on 'high fashion' but rather on 'entry-level designs' of clothing and apparel. A number of private educational boutiques have also are offering Production Planning course. Even so, we believe that there is need for a stand-alone Institute of Design (InDESI). It will be different in that it will incorporate both entry-level skills as well as more specialized skills preperatory to *haute couture* offerings.

1.11.2..2 Networking with *haute couture*

A second major ingredient of any medium-term tactical action plan for the designer goods industry is to increase the exposure that Bangladesh's designers have to creative work of world-class quality of the kind that are regularly demanded by markets in rich countries of the world. Towards this end, it is of very high priority that Bangladesh stage international fashion and design exhibitions on its soil once every three years. SME Foundation would be the ideal institution to develop one whole Development Planning Project (DPP) solely dedicated to this vision.

Why are international exhibitions such a catalytic idea? This is largely because design, fashion and life-style goods are innately anchored in a craft tradition. The highly individualistic customization that is the hallmark of good fashion and design work tends to be highly proprietary, and defies codification. Even what is printed in catalogues tend to cloak the *deus ex machina* of the artistic *tour de force* within the crochets or the hems or something like that. The mastery that lies behind works of arts on substrates of cloth and wovens and the like can really do with a great deal of de-construction. While distance and borders and time zones can obstinately impede this de-construction, exhibitions by breeding proximity, visual inspection, 'touch and feel', can do much to dissipate the mystique and myths of 'worldclass' arts of fashion and design. Local designers could feel their creative endorphins rushing merely by being able to see, albeit from close quarters, the products and wares of international famous designers and creative directors of major design boutiques in France, Italy and the United States. To trained eyes, seeing is not only believing: it is also learning , if only in gradualist, incrementalist, stages.

The writer of these lines once had an opportunity of having a conversation with one of Bangladesh's foremost designers of ladies' custom-made apparel. During the conversation, the designer, when asked to name her most deeply-felt need, gushed out in favour of Bangladesh holding international exhibitions regularly. This designer emphasized and re-emphasized that there is no substitute to demonstration and display of design and fashion objects from rich countries as a way of letting Bangladesh's myriad designers and producers come close to such objects. Sheer physical closeness has been known to pique creativity and innovation. We therefore propose that SME Foundation take quite seriously the idea of organizing international exhibitions once every three years.

It is true of course that the international fashion and design industry, of which the *avant-garde* is clearly located in France and, to a lesser extent, in Italy, is one of the most discriminating global industries. They tend to be very fastidious and removed before commiting their partipitation. An important problem that will need to be solved before we can have any result is about how to spawn sufficient 'ownership' among the captains of international fashion and design industry favouring the institution of such fairs on the soil of Bangladesh once every three years.

1.11.2..3 Needs assessment

Despite the fairly high marketing margin in the designer goods industry, one common refrain voiced by the micro producers and the artisans working in the clusters had been that the 'aggregators' 'make a killing' while putting the squeeze on the artisans. Now, of course it is true that it is the aggregators that conjure and jazz up the designs, manage the supply chain of the inputs, and, above all, take all the collateral risks of production, storage and marketing. Of course, it is the aggregators that are the life-blood of the productive activity of which the artisans are also the beneficiaries. All that is true and tested. A 28 sq-ft nakshikatha that retails in Dhaka at Tk. 6000-7000 on which the marketing margin, conservatively, is 40% or some Tk. 2500 as gross margin.[39] That article could take one female artisan, living and working in her village home 14 working days, for which effort she would be paid Tk. 400-450 or so.[40] Of course, the aggregator is doing a useful job, which ought to get done. Even so, there appears to be a need, in the interest of being true to 'corporate social responsibility' to increase competition facing today's aggregators in a market-friendly manner: it is only by increasing competition on the demand side that the tens of thousand rural, and mostly struggling, producers in the teeming clusters can be empowered by way of marketing, pricing, information, and, at the end of the day, of a better remunerative deal for their services.

1.11.2..4 Needs assessment

There is an obvious need for interventions---whether through public action including public-private partnership(s), or through actions by the private sector---to contain production costs in this industry. In this area of cost-containment there is a whole lot that either the public sector or the private sector can do even in the short run. For instance, each of the following actions is feasible and practicable, and will impact favourably on the level of unit costs in the designer goods industry:

(1) Harnessing the 'micro-credit' movement as a vehicle to the end of broadening the upgrading of all 'pit-fly' looms in the major handloom clusters to 'chittaranjan semi-

[39] From the traders' survey, we know that the average marketing margin in the designer goods industry was earlier reported to 56%, which is the highest on our sample.
[40] A young woman working full-time in the villages for an aggregator rarely makes above a range of Tk. 900-1000 a month.

automated' looms, using 'hire-purchase' or, in the parlance of *shariah-based banking, mudaraba* purchase, as instruments.[41]

(2) The embroidering machines that most female artisans use in the field are antiquated models, manually operated and have very low stitching capacities. Versions with higher daily rated production capacities and are physically more humane are available: these upgraded version also lead to lower production costs. Naturally enough, they cost substantially more than these traditional versions. The largely women artisans who staff these traditional *karchupy* frames are priced out of being able to afford these upgraded versions. The SMEF ought to initiate a project to bring these upgraded frames into broader use in the karchupy clusters in such areas as Mirpur, Mohammadpur, Jatrabari, Kamrangir Char, etc. With this end in view, the SME Foundation would need to start talking with BRAC, Grameen, RDRS, TMSS and other major micro-credit leaders, but also with WEAB, BWCCI and CWCCI. The key objective of such a 'conference' would be to formulate a pro-poor sector development programme for the production clusters of the designer goods industry. Within that broad framework, specific technical-assistance work could be commissioned with a view to bring about the upgrading of the *karchupy* frames in the clusters. The same case could also be made in favour of upgrading of the embroidering machines in use in the clusters.

1.11.3 Actions

(1) The SME Foundation should take the lead in creating the vision for and a business plan for an Institute of Creativity and Design. The Institute might be affiliated with the Dhaka University's faculty of Fine Arts. Rather than only aim at design competencies in the context of textiles and clothing alone, this will work more broadly.
(2) The SME Foundation should take the lead in financially sponsoring a small band, say 12, of highly innovative young designers, selected from across a number of substrate specializations. The value of annual scholarship would be Tk. 250000 a year. The selected candidates would enrol for part-time studies and upgrading in this programmes. A large part of the pool of this money would be earmarked to pay for travel, board and lodge of one or two well-known alumni of NIFT for a period of two months. A second part of the pool would be earmarked for paying 'user fees' to the BGMEA's fashion laboratory and classroom facilities. The cost of hiring teaching faculties will also be paid out of that pool of money. The remainder of the money, some Tk. 125000 will be paid out to the alumni. For two months, these 12 designers would have the potentially quite valuable opportunity of being interned under the care of two of NIFT's better-known alumni.

(3) This is one area where the SME Foundation needs to form informal partnership with the trade bodies that have done the most for 'empowering' women producers in the designer goods industry, viz BWCCI, CWCCI, WEAB, NASCIB and BanglaCraft. The specific objective of the partnership would be to open a 'cost' center, legitimized by a Memorandum of Understanding (MOU) between these stakeholders, to be operationalized so as to provide tiny and micro, women-owned production businesses in the clusters access to markets in metropolitan areas. The leadership for formulating the modus operandi for creating, funding, maintaining and adapting these 'cost centers' could be entrusted to the Policy Advocacy and Gender Equality (PAGE) of the SME Foundation.

[41] This would of course require selective 're-engineering' the processes of customer-search and –appraisal in use in the mainly private banks.

(4) The SMEF should prepare in-house a business plan, including an implementation programme, for the upgrading of the production capacities in key clusters in the country that feed into the success of the designers goods industry. Selective upstaging of the financial benefits of women artisans in MiSmall establishments in these clusters ---and therefore specific advancement of the cause of pro-poorness---should be organizing principle of the business plan and the implementation programme. This would be a business document. It should clearly identify the specific objectives of the implementation programme, the key actors or institutions to be involved in the delivery of the services and their tasks (and thus the division of labour to be supported), the nature and results of the interdependencies among the various collaborating institutions and individuals. It should specify the terms and conditions under which the SME Foundation would like to collaborate with the trade bodies and the Micro-credit leaders so as to provide a major stimulus to the upgrading of the productive capacities in clusters with a large concentration of women-run micro and small establishments that constitute the supply chain of major design houses of the country.

(5) Actions must be taken to enhance affordable supply of credit to the designer goods industry, especially to ‘micro’ and ‘small’ firms in the industry. Towards this end, the SME Foundation ought to try to ‘fast-track’ the onset of credit wholesaling in a targeted manner to firms in production clusters that have achieved critical supply mass in a national context.

(6) The SMEs in general and the firms in the MiSmall class of firm need to be proactively mainstreamed into being more abundant users of information and communications technologies. The SME Foundation would certainly like to become even more involved in harnessing the ICTs for the management and dissemination of knowledge and knowledge-based public-goods inputs for advancing the common good of the producers and players of the designer goods industry of Bangladesh.

Annex-1

Harnessing Stochastic Production Frontier in search for diagnostic wisdom

The point of the presentation of this model, and some results based on it in Section 2.0, is to demonstrate that it is practicable to glean valuable diagnostic results from a dataset generated with policy research in mind.

Estimation of the SPF requires a particular functional form of the production function to be imposed. A range of functional forms for the production function frontier are available, with the most frequently used being a translog function, which is a second order (all cross-terms included) log-linear form. This is a relatively flexible functional form, as it does not impose assumptions about constant elasticities of production nor elasticities of substitution between inputs. It thus allows the data to indicate the actual curvature of the function, rather than imposing *a priori* assumptions. In general terms, this can be expressed as:

$$\ln Q_{j,t} = \beta_0 + \sum_i \beta_i \ln X_{j,i,t} + \frac{1}{2}\sum_i \sum_k \beta_{i,k} \ln X_{j,i,t} \ln X_{j,k,t} - u_{j,t} + v_{j,t}$$

where $Q_{j,t}$ is the output of the establishment j in period t and $X_{j,i,t}$ and $X_{j,k,t}$ are the variable and fixed establishment inputs (i,k) to the production process. As noted above, the error term is separated into two components, where $v_{j,t}$ is the stochastic error term and $u_{j,t}$ is an estimate of technical inefficiency.
Alternative production functions include the Cobb-Douglas and CES (Constant Elasticity of Substitution) production functions. The Cobb-Douglas production function is given by:

$$\ln Q_{j,t} = \beta_0 + \sum_i \beta_i \ln X_{j,i,t} - u_{j,t} + v_{j,t}$$

As can be seen, the Cobb-Douglas is a special case of the translog production function where all $b_{i,k}$ = 0. The production function imposes more stringent assumptions on the data than the translog, because the elasticity of substitution has a constant value of 1 (i.e. the functional form assumption imposes a fixed degree of substitutability on all inputs). And the elasticity of production is constant for all inputs (i.e. a 1 percent change in input level will produce the same percentage change in output, irrespective of any other arguments of the function).
The CES production function is given by:

$$Q_{j,t} = \gamma\left[\delta X_{i,j,t} + (1-\delta) X_{2,j,t}\right]^{-1/\theta} - u_{j,t} + v_{j,t}$$

where q is the substitution parameter related to the elasticity of substitution (i.e. q = (1/s)-1 where s is the elasticity of substitution) and d is the distribution parameter. The CES production function is limited to two variables, and is not possible to estimate in the form given in (7) in maximum likelihood estimation (MLE) (making it unsuitable for use as the basis of a production frontier). However, a Taylor series expansion of the function yields a functional form of the model that can be estimated, given as:

$$\ln\left(\frac{Q_{j,t}}{X_{2,j,t}}\right) = \ln\gamma + (\upsilon - 1)\ln X_{2,j,t} + \upsilon\delta\ln\left(\frac{X_{1,j,t}}{X_{2,j,t}}\right) - \frac{1}{2}\upsilon\theta\delta(1-\delta)\left[\ln\left(\frac{X_{1,j,t}}{X_{2,j,t}}\right)\right]^2 - u_{j,t} + v_{j,t}$$

The model can be estimated as a standard or frontier production function, and the parameter values derived through manipulation of the regression coefficients. The functional form in (8) can be shown to be a special case of the translog function where $b_{i,i}$ = $b_{k,k}$ = *-0.5*$b_{i,k}$.

Given that both the Cobb-Douglas and CES production functions are special cases of the translog, ideally the translog should be estimated first and the restrictions outlined above, tested. However, the large number of variables required in the process of estimating the translog may cause problems if a sufficient data series is not available, resulting in degree of freedom problems. In such a case, more restrictive assumptions must be imposed.

To estimate the stochastic production frontier, an appropriate functional form is assumed (i.e. Cobb-Douglas, CES or Translog production function) and the parameters of the model (including s^2_v and s^2_u) are estimated by MLE. Estimation of the maximum value of the log likelihood function is based on a joint density function for the split error term $e_j = v_j - u_j$ (Stevenson, 1980). From this, technical efficient capacity utilization (TECU) can be calculated for the individual firm, given by:

$$E\left[\exp(-u_j)\middle|\varepsilon_j\right] = \frac{1-\Phi(\sigma_A + \gamma\varepsilon_j/\sigma_A)}{1-\Phi(\gamma\varepsilon_j/\sigma_A)}\exp(\gamma\varepsilon_j + \sigma_A^2/2)$$

where, $\sigma_A = \sqrt{\gamma(1-\gamma)\sigma_s^2}$, $\sigma_s^2 \equiv \sigma_u^2 + \sigma_v^2$, $\gamma \equiv \sigma_u^2/\sigma_s^2$

and Φ is the density function of a standard normal random variable (Battese and Coelli, 1988). From this, if g = 0, then the expected value of the TECU score is one. That is, there are no deviations due to technical inefficiency or capacity underutilization (i.e. $\sigma_u^2 = 0$). If g = 1, then all deviations are due to technical inefficiency and capacity underutilization (i.e. $\sigma_v^2 = 0$). Hence if 0< g<1, deviations are characterized by both TECU and a random or stochastic component (Battese and Corra, 1977).

In order to separate the stochastic and TECU effects in the model, a distributional assumption has to be made for u_j (Bauer, 1990). From the literature on technical efficiency estimation, four distributional assumptions have been proposed: an exponential distribution i.e.

$$u_j \approx \exp(\Theta)$$

(Meeusen and van der Broeck, 1977); a normal distribution truncated at zero, for example, $u_j \approx \left|N(\mu_j, \sigma_u^2)\right|$ (Aigner, Lovell and Schmidt, 1977); a half-normal distribution truncated at zero i.e. $u_j \approx \left|N(0, \sigma_u^2)\right|$ (Jondrow *et al.*, 1982); and a two-parameter Gamma/normal distribution (Greene, 1990).

There are no *a priori* reasons for choosing one distributional form over the other, and all have advantages and disadvantages (Coelli, Rao and Battese, 1998). For example, the exponential and half-normal distributions have a mode at zero, implying that a high proportion of the firms being examined are perfectly efficient. The truncated normal and two-parameter gamma distribution both allow for a wider range of distributional shapes, including non-zero modes. However, these are computationally more complex (Coelli, Rao and Battese, 1998). Empirical analyses suggest that the use of the gamma distribution may be impractical and undesirable in most cases. Ritter and Simar (1997) found that the requirement for the estimation of two parameters in the distribution may result in identification problems, and several hundreds of observations would be required before such parameters could be determined. Further, a maximum of the log-likelihood function may not exist under some circumstances. Bhattacharyya *et al.* (1995), however, offer one approach for selecting the distribution to reflect technical inefficiency; they suggest the use of a data generating process.

Technical efficiency (TE) measures the relationship between a establishment's inputs to the manufacturing process and its outputs, with full efficiency being achieved when outputs are maximised from a given set of inputs. Inputs can be fixed (e.g. the machinery, looms, engine, other equipment, etc.) or variable (e.g. labour input, working capital, etc). Fixed inputs may also be intangible, such as entrepreneur’s skill and quality differences between technologies. TE scores can be calculated using the econometric stochastic production frontier (SPF).

In the present case, we opt for Cobb-Douglas as the form of the production function to provide a kind of initial estimate of the stochastic frontier. Using Maximum Likelihood Estimates of such a production function, we obtain the sample variances of the normally distributed error component, and the ‘irregular’ error component with a truncated distribution. Using these, it is possible to calculate the value of the frontier, as also the value returned for each of the sample observation for the efficiency or capacity variable of choice. We picked gross value added as our measure of ‘efficiency’. By deducting the value obtained for the observation from the frontier, we obtain a measure of the ‘distance’. It is this distance that we then regress on a large number of explanatory variables, each of whom has a certain diagnostic value.

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Volume-6

Bangladesh's Leather and Leather goods Industry, baseline, profile, performance and plans for upgrading

Naeem Chowdhury, D.D.E (Cambridge) Ph. D (Cambridge)
Team Leader
CDS Team of Consultants

A study for SME Foundation, Dhaka

By

Center for Development Studies, Dhaka

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Executive Summary

Results concerning the 'economics' of the leather and leathergoods sector

With an average 'headcount' of some 19 workers in the MiSmall class of firms, but with 290 workers in the MeLarge class of firms, Bangladesh's leather and leathergoods produces Tk. 38 billion worth of value added. The sector accounts for some 3% of the export receipts of Bangladesh. We estimate that as of 2007 there are 2200 enterprises/establishments in leather and leathergoods industry, including some 1400 'job workers'.[42] With an average firm age of 21 years as of 2007, this is one of the oldest industries now in the private sector---only jute and cotton textiles are older. While average size of firm ranges between 6 for the micro subsector to 21 for the small subsector to 70 for the medium subsector, the average size of the 'large' segment of the industry is a relatively humongously large size of some 621 workers.[43] At start-up, this industry was fiercely reliant on equity as opposed to debt, garnering almost all the capital used during the start-up year from own-account resources. About sixty percent of the establishments make a living as a contract manufacturers, while another 39% are own-account producers---with the remainder being in a dual-mode.

Overall, gross value of output per firm is Tk. 224 million among the own-account producers, while for the contract manufacturers, it is Tk. 74 million. Gross value added for the sample as a whole is found to be Tk. 131 million. More important, value added as a percent of gross value of output for the OAP firms is 48%, while for the CM firms, it is found to be 56%. Leather and leathergoods happens to be the second most 'productive' space to be in terms of this particular metric, after the designer goods industry.
Leathergoods segment dominates the industry when it comes to investment in core equipment, accounting for some 88% of the overall investment in it.[44]

The 'economics' of the technological choices made by firms in leather sector

Capital-labour ratio---defined on the basis of replacement cost per worker employed---is found to be overall Tk. 233 thousand. The value for this ranges between MiSmall and MeLarge class of firms Tk. 194 and 255 thousand. Labour and machine productivity have been evaluated using physical units of a benchmark kind of homogeneous-output. The latter was obtained by 'chaining' output of what are relatively minor in revenue importance into units of the 'dominant' or 'benchmark' output in the firm's mix. Using such measures of average physical productivity, we

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[42] We exclude 'job-workers' and those micro establishments with 'headcount' of less than 7 when it comes to grossing up from our sample estimates to the corresponding statistical universe of the entire industry. Failure to do so leads to the grossed-up amount of value added becoming more than 5 times BBS estimate of gross domestic product arising in leather, footwear and leathergoods subsectors---a quite unacceptable concoction.

[43] This estimate is no doubt due to some of the country's largest leathergoods and footwear segments being included in our sample. Omitting them from the sample would have pared back the average employment size of the sector quite significantly. It was not advisable to omit them because by doing so we would have exposed ourselves to the criticism of not have implemented the sample size that we had promised we would cover.

[44] Part of the reason for this is that for a lot of the machinery and equipment used in other segments (such as tanning, and cottage footwear production don't really have well-developed marketing channels, with replacement cost markers to match. It is also true that both these segments are very lean operations, priding themselves on skimping fixed investment in plant and machinery.)

find that such per-worker productivity monotonically rises across firm size classes from micro to medium establishments.

Comparative physical productivity of MiSmall *versus* MeLarge firms

Overall, MeLarge firms have a statistically significant advantage *versus* MiSmall class of firms in terms of such average productivity estimates. The same is true when it comes to machine physical productivity, although this time the difference is not quantitatively as significant as when average physical labour productivity was in question. Using ratio between arithmetic mean based on values of output and input, we also estimate elasticity of physical output with respect both the number of workers employed and machines employed. On both occasions, MiSmall firms, respectively, out-produce MeLarge firms (have elasticities of 1.075 *versus* 0.44, and 0.4 *versus* 0.16). **We conclude that MiSmall firms are indisputably more productive than MeLarge class of firms.** Estimates of Cobb-Douglas production function are as follows: value of the exponent of natural log of labour used is 0.55; of fixed capital, .38; and materials, 0.17. All three coefficients are statistically highly significant, and F-ratio suggest that the functional form used is a highly satisfactory representation of the production surface. Tests convincingly suggested that returns to scale in this industry were constant. Its policy significance is that the state of competition among firms in this industry is on an even keel, and that therefore 'competition policy' ought to be off the charts in this case.

Factors driving the 'distance' from production frontier

Two factors were found in multivariate regression analyses to be promoting 'efficiency' in terms of the distance from the estimated production frontier, namely, capital-labour ratio, and the educational attainment of the Managing Director of the firm. Both return a negative coefficient on the distance function, and the first-named is statistically highly significant. This finding supports a programme for investing more by way of fixed investment (especially in core machinery), whether funneled by direct investment by the firms themselves, or by the creation of common facilities center whose functionalities the firms themselves could harness on their way to greater productivity.

Two factors however significantly remove the firms from the frontier. One is the fact of being a borrower of a bank. A bank borrowing status causes firms to become less efficient. The second variable that has the same effect is the percentage of imports in the value of inputs used. Both are found to lower 'efficiency'.

Access-to-finance regime in the leather and leathergoods industry of Bangladesh
Average bank lending to MeLarge *versus* MiSmall firms has an advantage by a factor of more than nine: one when the full sample is taken into account. Significantly enough, as compared with MiSmall establishments who are dwarfed in terms of the loan size, the rates of interests paid by MeLarge establishments are statistically slightly lower than the MiSmall class. The evidence is therefore clear that MiSmall establishments are under-banked compared with MeLarge firms.

Working capital provisioning *versus* requirements

Average working capital provisioning for the MeLarge firms enjoys an advantage of a factor of more than 33 times. Average capacity utilization ranges between 50.5% for the micro firms to a high of 76% for the large firms. MiSmall firms underutilize their own capacities by as much as 36%. That is the basis whereon we conclude that MiSmall are starved of finance to the tune of at least 36% of their requirements.

Structure of costs of operation

A full 89% of the costs of operations are accounted for buying hides, chemicals and salt. This result is completely in conformity with UNCTAD which has reported that globally material costs (of all types) account for some 90% of the cost of production (UNCTAD, 2006). Wages are so low that they account overall for only 5.7%. Both cubic cost functions and flexible-form trans-logarithmic functions show that costs tend to rise in tandem with output but then falls. This implies that firms at low levels of output suffer from a competitive handicap: this is the stage of their life-cycle when they are relatively more vulnerable. This is when they need legitimate public assistance the most.

Factors that should enter into the formulation of a growth strategy for the sector

Demand for labour and capital

Labour demand is negatively affected by the prevailing wage rates. There is a strong case for the maintenance of policies that help stabilize wage rates at relatively low levels. Reservation price is about the minimum opportunity cost that is consistent with the worker being able to reproduce its labour-selling power and thus deciding to supply labour. Essentially, reservation price revolves around workers' cost-of-living. Clearly, there is a lot that public policy can do about workers' cost of living. Foremost among them is about leveraging the cost of food as a policy variable. Macroeconomic stability is needed urgently, so that the 'reservation price' of unskilled labour could be stabilized at low levels. The labour demand function is positively sloped in product price, fixed capital, and automation (D_a). Output---or, more precisely in this context, capacity utilization--- has positively drives the demand for all factors of production, whether it is labour, capital or material input.

Product price is about the quality and the design of the product, its workmanship, the use of more expensive, more attractive and yet more user-friendly packaging material for the product. Ultimately, this is about the amount of industrial knowledge that goes into the product. The higher is quotient of the application of knowledge embodied in the product, the larger is its knock-on effects on the demand for labour that it creates. This lends support to the urgency of designing and implementing capacity building programmes that empower especially product design specialists, firms, trade bodies and civil society organization with knowledge. Knowledge in this context means and includes sector-specific knowledge, product-specific knowledge and process-specific knowledge.

The amount of fixed capital that an enterprise has to work with also positively drives its need for worker. This implies that there is also a need, in the interest of spurring pro-poor growth, to increase the capital provisioning especially of MiSmall establishments. Such enhanced capital provisioning would energize their demand for labour, and would be good news for pro-poor growth.

The higher is the index for automation, the higher is the demand for labour. Automation need not forever lead to contract the number of jobs offered by a firm.

Output is a strongly positive and statistically significant coefficient of both labour demand, and capital demand. This means that initiatives to promote the increasing of the capacity utilization are helpful.
Credit rationing may well exist in the credit markets in the leather sector. When the credit market is supply constrained, and that in order to obtain more credit, one needs to raise the interest rate. Capital demand function is also spurred by automation.

In order to stimulate the demand of capital by the establishments in the industry, efforts have to be made in order to lower the prevailing interest rate so that access to capital becomes more and more affordable. Clearly, public policy can help somewhat with lowering interest rates. Foremost among them is about empowering public-private partnerships (PPP) such as the Small and Medium Enterprise Foundation (SMEF) credit wholesaling programmes.

Material input demand

Material input demand is negatively sloped in own price, but positively sloped in product price. Material demand is also positively sloped in automation.

In order to stimulate the demand of material inputs in the industry, efforts have to be made in order to lower prices of raw materials.

Recommendations

The volume makes wide-ranging recommendations to improve the formulation of policies, capacities, competencies, ‘infrastructures’ and the applications of information and communications technologies in the management and dissemination of knowledge and knowledge-based public-goods inputs for advancing the common good of the producers and players of the leather and leathergoods industry of Bangladesh.

1.1 Volume's introduction

In this volume six, we present results generated by one of the most in-depth analysis ever done of important segments of Bangladesh's leather and leathergoods industry.[45] With sustained economic growth, rising per-capita incomes, growing interest in rural areas of Bangladesh in livestock raising as an important livelihood niche and growing exposure to global trends concerning what is 'fashionable' and the effects of a mass-media which is always 'on-message', the demand for all manners of leather goods, footwear, and the like is growing quite strongly. In addition, a footprint of rapid change has stamped itself vividly on the global leather and leathergoods industry. China, which during the last thirty years rose to the rank of undisputed world leader in terms of output of tanned leather, and shoes, is now mulling disengagement from the environmentally inclement leather production. The prospects of China's rollback have sent shock waves and piqued interest of many a country with a substantial production of cow hides and goat skin.

The rest of this volume is structured as follows. Section 4.2 introduces the economic basis of the sector. The coverage of themes here include (i) the structure of the sample of firms in terms of its composition, average employment size, the relative prominence of own-account production *versus* contract manufacturing, the levels of gross value of output versus gross value added. Section 4.3 is about some entrepreneurial success stories in the sector. Section 4.4 is about the technology setup in use in the sector, including the relative prominence of different packages and platforms of equipment and machinery in used, the relative structure of the replacement costs of the core equipment, the ensuing average physical and marginal productivities with respect to labour and number of machines. This section also estimates production functions based on the data, and uses the ensuing coefficients in tests carried out of whether returns to scale are constant or not. As well, in an important econometric exercise, the data are used in obtaining estimates of a stochastic frontier production function, and also the 'distance' of each sample observation from the estimated frontier in terms of a measure of 'efficiency', in this case gross value added. This 'distance' is also then explained using multivariate regression models so as to eventually obtain certain diagnostic insights about the drivers of efficiency in this industry. Section 4.5 takes up the state of the access-to-finance regime in the sector. Section 4.6 seeks to generate comprehensive insights about the marketing issues. Section 4.7 is about the drivers of cost levels in the sector. Section 4.8 is about the use of ICT platform in the industry, and Section 4.9 is about the management hierarchy of the sector. Section 4.10 addresses the elements of what is needed to formulate a growth strategy for the sector. This is where we estimate average annual growth rates that sample observations have had over their lives, measured in each of four different ways, and then invoke multivariate regressions models to explain inter-firm variations in growth rates.
Section 4.11 is about the impact of regulatory regime on the cash-gain prospects of the firms, from the perspectives of the latter.

[45] The Bangladesh Standard Industrial Classification (BSIC) 4-digit codes that frame the ensuing discussion are presented later in this report.

1.2 Bangladesh's Leather and leathergoods industry

1.2.1 A Broad Profile of the Sample

Table 1.1: This report is about the leather and leathergoods industry of Bangladesh.

Firm size class	No. of Firms	% of total	Average Employment per firm			Employment size per firm
			Production workers	White-collar worker	Others	
Micro	16	11.5	4.12	1.62	0.13	5.87
Small	73	52.5	7.96	3.85	0.01	21.84
Medium	30	21.6	60.80	3.63	.3	69.73
Large	20	14.4	555.7	62.7	2.35	620.8
MiSmall	89	64.0	15.47	3.44	0.06	18.98
MeLarge	50	36.0	258.76	30.26	1.12	290.12
All	139	100.0	102.98	13.09	0.43	116.5

Source: SMEF survey of six sectors, 2006/07

The leather and leathergoods industry has the following segments:
Leather tanning;

Manufacture of leather footwear;

Manufacture of leathergoods such as ladies bags, wallets, key rings, and the like;

We start by profiling the sample of establishments on hands, beginning with the characteristics of employment. Table 1.1 reports in a nutshell several things. First, it says that we have 139 firms on our sample in this study, 89 of which (or 64%) are either micro or small.[46] Another 36% are either medium or large. This is an industry the average firm sampled corresponds to the large scale: average employment size or headcount is in excess of 116 or so. Strong differences persist however between the MiSmall and MeLarge class of firms, with 64% of the firms rate an average of only 19 or so workers, while 36% of the firms rate an average employment size of 290 or so. Overall, 103 out of a total of 116 workers (or 89%) happen to be production workers. The MiSmall category of firms report an average ratio of 81.5% in this respect, as compared with 89.1% for MeLarge firms. MiSmall class of firms report an average headcount of 19, as against 290 for the MeLarge category of firms.

Broad profile of the size-structure and employment characteristics

Table 1.2 is an expose into the gender balance of the employment situation in this sector, as also about the asymmetry between male and female workers in terms of the length of industrial work experience. Overall, we find that MiSmall firms scarcely *hire* any female workers. Twenty seven percent of the employment offered by the MeLarge firms are taken up for female workers. Overall, 24.45% of the employment comprises female workers in this industry. The second dimension highlighted by Table 1.2 is about the length of industrial experience across gender.

[46] It will be recalled that a firm with between 1 and 9 workers is treated in this study, as by the BBS, as micro; between 10 and 49 workers, small; between 10 and 49 workers, medium; and between 10 and 49 workers, large.

Whereas experience length for male and female workers split on a 8.7: 0.11 ratio, suggesting a very severe imbalance for MiSmall firms, the MeLarge firms are characterized by a vastly improved balance (4.8:1.5). As well, the MeLarge firms appear to be hiring relatively younger male workers with not a great deal of industrial experience.

Table 1.2: Gender balance in employment levels and gender contrasts in the length of industrial experience

Firm size class	Average No. of			Average years of experience of		
	Male workers	Female workers	All	Male workers	Female workers	All
Micro	5.87	0	5.87	12.68	0	12.68
Small	21.65	0.19	21.84	7.83	.137	7.71
Medium	60.57	9.1	69.73	4.4	.63	4.41
Large	437.1	183.7	620.8	5.5	2.8	5.4
MiSmall	18.82	0.15	18.98	8.7	.112	8.6
MeLarge	211.18	78.94	290.12	4.8	1.49	4.79
All	88.01	28.49	116.5	7.3	.61	7.23

Source: SMEF survey of six sectors, 2006/07

Table 1.3: Geographical distribution of sample establishments in the Leather and leathergoods industry, 2006/2007

	No. of establishments	% of total
Dhaka	117	84.17
Gazipur	9	6.47
Narayanganj	2	1.43
Comilla	2	1.43
Chittagong	6	4.31
Kishoregonj	3	2.15
All	139	100

Source: SMEF survey of six sectors, 2006/07

We find that about 84% of the establishments in this industry have been sampled from the geographical limits of the district of Dhaka. This is understandable as the oldest tanneries are all located at Hazaribagh.

1.2.2 General Introduction to the Leather and leathergoods industry

1.2.2.1 Scope and quality of entrepreneurial preparation of firm's creators

Successful company brands and the creation of brand loyalty typically call for entrepreneurial performance of a high caliber. According to Schumpeter, entrepreneurial performance is the defining characteristic of success in building an enterprise from the ground level up. What, however, is entrepreneurial performance, and how is one to best measure it?

Entrepreneurship is more than management, as the latter is popularly understood. Management is about managing inputs and processes, in their various aspects, that are prerequisite to satisfactorily producing the output of an establishment, based on a set of operating standards that have evolved over a period of time. Entrepreneurship is management, and then some. At times, the operating standards implicit in the routine operational procedures that amount to a best practice are bound to change suddenly and without notice for a manager/entrepreneur. A major buyer might for instance suddenly and without any notice slap upon the enterprise a binding unit price that is drastically lower. An important regional buyer has suddenly rejected a very large quantity of latest shipment of goods, causing a scramble at the headquarters of the exporter to find the root cause of the rejection. Received wisdom is of relatively little use during these periods when shocks---of one kind or the other---intervene. It is during these tumultuous times that the mettle---the entrepreneurial resilience--- of the enterprise is put to the test. How vigorously and how innovatively the enterprise will stage its response to the fuss at hand will typically depend upon how well-prepared as an entrepreneur. An entrepreneur is one who 'fills a gap' in the market-place, according to Leff (1968), thus dealing an effective solution to the absence of a complete set of markets---a frequent source of 'market failures' in economics. An entrepreneur is one who 'spots value in unlikely places and puts it to use to the point of improving his financial performance', thus hitting off with an effective improvisation in a market for 'credence goods'[47]---a frequent source of 'market failures' in economics.[48] The question is this: what are the ideal measures of entrepreneurial preparation. We used three variables to measure entrepreneurial preparation: (i) number of years of formal schooling obtained by the entrepreneurs; (ii) whether the entrepreneur has acquired any specialized academic training that is directly connected with the running an enterprise in the industry in question; (iii) the 'degree of relevance' of the specialized training received by the entrepreneur. Tables 6.4 through 6.5 report the findings concerning the degree of the entrepreneurial preparation by the entrepreneur.

[47] Credence goods are characterized by unequal distribution of gainful information, setting buyers of goods apart from sellers, and giving rise to the problem of informational asymmetry (American Economic Review, 1994).

[48] David Morawetz, in a seminal review article, informed us of how a Japanese printing entrepreneur, while visiting with an US-based entrepreneur in the same industry, spotted a block printing machine lying discarded in the former's cellar, bought it and shipped it back home, to a better financial health of his enterprise. (The US proprietor had discarded the block printing machine because, at the then higher US wage rates, the labour productivity of the latter was not high enough. In Japan, the wages were still low enough to make the 'import' of the machine profitable). This action by the Japanese entrepreneur was an entrepreneurship *par excellence*.)

Table 1.4: Length of formal education, and the extent of the acquisition of specialized training in ______________________________ industry surveyed (Averages)

Size class	Age of the establishment	Years of formal education by the entrepreneur			% with any specialized training
		Mean	Standard deviation	Coefficient of variation (%)	
Micro	25.44	5.83	5.54	0.950	0
Small	23.94	9.22	5.86	0.635	0
Medium	14.77	11.94	5.75	0.481	0
Large	17.64	13.95	5.84	0.418	4.5
MiSmall	24.26	8.51	5.92	0.695	0
MeLarge	15.97	12.77	5.82	0.455	1.9
All firms	21.1	10.14	6.22	0.613	0.7

Source: SMEF sample survey of the leather and leathergoods industry

Note: By specialized training, we mean particularized diplomas that upgrade specific vocational or industrial or technological skills in the trainees. For example, the questionnaire asked: "Did the Managing Director obtain a Masters or Diploma in Fashion Technology?"

The table shows that the average MiSmall establishment was born 24.26 years ago, while the corresponding average for the MeLarge establishment was 15.97 years. The difference is statistically significant. The average leather and leadthergoods establishment was born about 21.1 years ago. Secondly, the average educational attainment of MeLarge establishment (of 12.77 years of schooling) exceeds the corresponding attainment of the MiSmall establishment of about 8.51 years, and this difference between the averages is statistically highly significant. Finally, only about 0.7% overall of the managing directors on the sample have had any exposure to specialized training.

1.2.2.2 Financing start-up capital involvement: magnitude, external and internal reliance

As said already, we follow the enterprises through their life-cycles even we launch into the narrative. That is to say, we start now with the economic circumstances of their mobilization of the start-up head-count, scale of operations and, more to the point, the manner in which they had mobilized their start-up capital. The results relating to these aspects of the narrative are presented in Table 1.5 below.[49] The table reports on several variables, including the employment size and number of core machines at start-up. It also reports on average amount of equity and loans mobilized by the entrepreneur at startup. The idea is to present an idea about the economic and financial circumstances that surrounded the entrepreneur at startup.

[49] Firms have been classified with respect to size based on their employment size as of 2006/2007.

The main findings of the table as follows. First, the average MiSmall firm started up with xx workers, xx machines, equity or retained earning provisioning of xx and debt of xx. As a result, debt-equity ratio at start-up year of the firms average at xx:yy.

Table 1.5: Start-up economic circumstances of the sample establishments in the Leather and leathergoods industry,

Firm-size	No. of start-up		Percentages of total start-up financial capital mobilized (Tk. 000s)				
	employees	machines	Equity/ Retained earning	Bank loans	Non-bank loans	Loans from friends, relatives	All debt
Micro	15.8	4.1	4493.8	0	0	72	72
Small	20.3	6.0	10545.3	1178	72	293	1543
Medium	43.3	26.2	111570.0	187	70	235	492
Large	348.4	87.4	108039.0	5750	35	75	5866
MiSmall	19.3	5.6	9457.4	966	59	253	1279
MeLarge	172.4	50.0	110157.6	2412	56	171	2639
All	76.6	21.4	45680.5	1486	58	224	1768

Source: SMEF survey of six sectors, 2006/07

Table 1.6 looks at the start-up financial mobilization of the firms from yet another perspective. It presents the percentages of cases where at least one loan was contracted in the start-up year. These percentages are presented in the third column of the table. By comparison, the last column p

Table 1.6: Percentage of establishments reporting reliance on debt finance at start-up

Farm status	No of loans at start-up	% of cases	% of cases without any loan at startup
Micro	4	25.00	75.0
Small	42	57.53	42.4
Medium	12	40.00	60.0
Large	6	30.00	70.0
Mi small	46	51.68	48.0
Melarge	18	36.00	64.0
All	63	45.32	54.6

Source: SMEF survey of six sectors, 2006/07

The table shows that while the MiSmall establishments in the leather and leathergoods industry report an average start-up headcount of 19.3 in the start-up year, the corresponding headcount for the MeLarge establishments in this leather and leathergoods industry happens to be 172.4. Whereas the representative MiSmall establishment in the leather and leathergoods industry reports an average number of machines of 5.6, the corresponding number for the MeLarge establishments in this sector happens to be 50. Likewise, whereas the representative MiSmall establishment in this industry report an average start-up equity of Tk. 9.46 million, the corresponding equity for the MeLarge establishments in this sector happens to be Tk. 110 million.[50], [51] Likewise, whereas the representative MiSmall establishment in this industry report

[50] Equity in our formulation includes retained earnings, including from other businesses wholly or partially owned by the entrepreneur in Jquestion.

[51] The establishments whether within the MiSmall or MeLarge categories start up in different years. Strictly speaking, it is not legitimate to group for pJurposes of calculating an average for them. That said,

an average start-up debt of Tk. 1.279 million, the corresponding debt for the MeLarge establishments in this sector happens to Tk. 2. 63 million. Overall, the debt-equity ratio at start-up of the micro and small categories of firms in the leather and leathergoods sector is found to be 1.57:98.43, 1.28:98.72. In other words, start-up debt in this industry seems to be virtually non-existent.

Equity including retained earning happens to be source of start-up capital of choice among the entrepreneurs in this industry. Use of, or access to debt, seems, strictly, to be a minority in this industry. This reliance on equity including retained earning especially by the micro, small and medium establishments in this industry as shown above also happens to be the general characteristic of the small and medium enterprises in Bangladesh in the general case as well.

1.2.2.3 Principal products and bye-products

Table 1.7 is about the relative prominence of establishments with different business models, and about the number of main products which are produced by the establishments. As well, we distinguish between two major categories of establishments, namely, (i) those who rely solely on *own-account production*, and (ii) those who rely solely on *contract manufacturing.*

1.2.2.4 Business model differences: own-account producers *versus* contract manufacturers

We mainly recognize two business models, namely, own-account producers, contract-manufacturers and others. Own-account producers are those who implement each of the stages of the life-cycle of being a manufacturer: designing products, calculating addressable markets and the size of production batches, buying raw materials, accessing finance, setting the price, and being responsible for marketing what is produced. If (s)he can do all of the above efficiently, minimizing his costs and maximizing his sales, (s)he will be in the black, and make money. The distinguishing characteristic of this business model is that the entrepreneur takes all the risks and pockets all the difference between the revenue and his costs. By comparison, contract manufacturing is a competing business model in which the manufacturer essentially works as an agent of a third party. The latter issues to the former the specifications of the products and the quality standards (eg the percentage of rejects in the output consistent with satisfactory delivery, etc.), and pays him a manufacturing charge for what (s)he manufactures: the CM has to buy up the needed supplies of raw materials and accessories. A variation on the above theme is that the third party procures the essential raw materials and supplies them to the contract manufacturers' (CM's) premises, and agrees to buy up to an agreed overall quantity subject to the CM passes muster in terms of the quality standards. In this case, of course the third party sets a different, and lower, price. But even so, the CM does not have to worry about buying supplies and taking the risks of marketing the product. The acid test of profitability for the CM is only that he correctly works out whether his unit cost of manufacturing subject to the third party's leaves him a positive margin of cash-gains. Besides these two dominant types, there is the largely residual, 'third', type we call 'others'. This

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one of the reasons why we still group them is that we want to calculate how much of growth the establishments have had since their start-up. We group them once again for purposes of calculating an average level of equity they have in the study year, namely, 2006-2007.

type comprises of establishments with dual-mode business models, such as when an own-account producer doubles up as a part-time trader of items similar to those that he also manufactures.

Table 1.7: Differences in specialization: own-account production versus contract manufacturing in Leather and leathergoods industry, 2007

Size class	Proportion of establishments that are in				Average no. of products
	own account production	Contract manufacturing	Others	All establishments	
Micro	1.44	9.35	0.72	11.51	1.05
Small	15.83	35.97	0.72	52.52	1.01
Medium	12.23	9.35	0	21.58	1.02
Large	8.63	5.76	0	14.39	1
Mismall	17.27	45.32	1.44	64.03	1
Melarge	20.86	15.11	0	35.97	1
All	38.13	60.43	1.44	100	1.01

Source: SMEF survey of six sectors, 2006/07

The table informs us that contract manufacturing comprises the single most important type of business models prevalent in the leather and leathergoods industry of Bangladesh. A clean 60.43% of all the establishments on our sample are found to be based on this model, whereas another 38.13%, overall, of the establishments are found to be working per the own-account production model. Close to 1.44% of the sample establishments belong in the 'other' type. Secondly, while the MiSmall and MeLarge establishments are set visibly apart from each other in terms of the percentages of CMs, the two classes are fairly similar when it comes to the percentage of own-account production, with the small balance being with the MeLarge establishments. The last column informs us that the average number of products manufactured by the establishments in the size-classes (ie, micro, small, medium and large) is 1.01.

The manufacturing interests surveyed by us belong to three major categories, namely, tanning of leather, footwear production (both large- and small-scale), and leathergoods production.

The output-mix of the sample establishments in the leather and leathergoods industry is in fact quite diverse, embodying several different features, functionalities, specifications, weight-length ratio, and the like.

Table 1.8 reports scale of output per establishment and the value of gross output of the sample establishments arrayed in order of their size, ranging from micro to large sizes. At this stage, it will only be in order to take cognizance of the mosaic represented by the results about the various average based on various ways of slicing and dicing the data. We should probably not wish to find well-defined patterns in the results. Several findings each rate a citation.

Table 1.8: Differences in scales of output between own-account production versus contract manufacturing in leather and leathergoods industry, 2007

Firm size classes	Average scale of output per unit engaged in physical units (000 units)				Gross value of output per establishment (Tk million)			
	Own-account production	Contract manufac-ture	Others	All	Own account producers	Contract manufacturers	Others	All
Micro	8.59	16.12	15.37	14.54	6.32	7.84	11.21	7.86
Small	166.37	86.53	42.93	111.27	115.72	30.41	9.60	55.83
Medium	667.46	210.80	0.00	469.57	390.09	121.26	0.00	273.59
Large	1487.39	556.83	0.00	1115.17	1298.51	1003.96	0.00	1180.7
MiSmall	152.65	76.86	29.15	98.54	106.60	25.75	10.41	47.21
MeLarge	1006.74	342.62	0.00	727.81	765.99	457.52	0.00	636.43
All firms	628.97	154.37	29.15	348.25	467.40	133.69	10.41	259.16

Source: SMEF survey of six sectors, 2006/07

First, for OAPs, physical output per establishment for the MiSmall and MeLarge establishments are, respectively, 152.65 thousand and 1006.74 thousand units. For all OAPs, the physical output per establishment is found to be 628.96 units. By comparison, the average scales of output for the CMs are typically lower, sometimes significantly lower. Thus, output per establishment for the MiSmall and MeLarge CM establishments are, respectively, 76.8 and 342.62 thousands. Both sets of mean differences setting MiSmall apart from MeLarge establishments are statistically significant. The average scale of output per establishments for the CMs of the MeLarge class is more than four times as large compared with the MiSmall establishments. Secondly, average gross output per establishment for the MeLarge class for the OAPs is Tk. 766 millions (approx) compared with Tk. 106.6 millions (approx) for the MiSmall class---in other words, is more than 6 times as large. Average gross output per establishment for the MeLarge class for the CMs is Tk. 457.52 millions compared with Tk. 25.75 for the MiSmall class---in other words, is more than 17 times as large. The upshot is that average unit-values[52] of the products of the MiSmall category of establishments are significantly lower compared with MeLarge establishments.

Average unit-values of output per establishment and the value of gross output of the sample establishments shows sometimes marked differences, within both the OAP and CM classes.[53] For the OAPs, while the average unit-values for the micro, medium and large classes are relatively closely strung around a value of around 4000, the small establishment ‘disturb’ this relative cohesion by positing an average value of 1493.9. That said, one could also argue that while cohesive stringing of values of output across

[52] For uni-product establishments, average price of product is a clear cut concept: this relates to what on average has the product of the establishment sold for. Matter are much less clear-cut when firms typically produce or custom-make between three and four different products, each replete with its own unit of measurement, level of technological complexity, the end-user it is supposed to cater to, and the input-intensities that characterize them. Here, unit values of different product will differ. Typically, different products will be ‘chained’ including by using a kind of method that we used, meaning one method that is based on using price relatives for the different products and thus ‘converting’ quantities of each of the ‘comparator’ products into units of a ‘benchmark’ or ‘dominant’ product segment. In this case, we get what we call average unit values across all different physical outputs of the establishments in question. That is why we are using the term average unit values.

[53] A separate table on these average unit value are not presented, to prevent clutter.

various sizes may represent a herding behavior, a discordant behavior, such as by the small size class of firm in the table above may well represent innovative behavior. It is the right of entrepreneurs in each class to put together their business plan and implement them as they see fit, whether such implementation might magnify or mitigate what to a statistician may represent concordance or discordance. We are presenting exactly what is in the data: that is our mandate. We see a similar pattern for the CMs too. While the average unit-values for the micro, small and medium classes are relatively closely strung around a value of around 2000, the large establishment class 'disturbs' this relative cohesion by positing an average value of 6674.6.

Table 1.9 presents gross value added for OAPs and CMs across our size class ranges. The Investment Climate Survey-I of 2002 had also reported gross value added for a sample of some 1000 enterprises that had composed that particular sample. It is customary to evaluate the performance of manufacturing enterprises in terms of gross value added. Value added is defined by subtracting from gross value of output (which is equivalent to sales or turnover per year) all outlay except labour payments, interest payments, VAT payments and other levies by local government institutions.

Table 1.9: Average gross value added by different types of establishments, 2006/2007

Firm size classes	gross value added per establishment, across three types (Tk. million)			
	Own-account producers	Contract manufacturers	Others	All
Micro	1.7	4.1	2.7	3.7
Small	27.1	6.4	5.1	12.6
Medium	159.1	78.1	0.0	124.0
Large	716.0	607.1	0.0	672.4
MiSmall	25.0	5.9	3.9	11.0
MeLarge	389.5	279.6	0.0	343.4
All firms	224.5	74.3	3.9	130.6

Source: SMEF survey of six sectors, 2006/07

Several findings deserve a mention. First, the overall average gross value added per firm in this industry is found to be Tk. 130.6 million in 2006/2007. That said, MiSmall firms only rate an average of Tk. 11 million worth of value added per firm, with the MeLarge firms rating an average gross value added of Tk. 343.4 million.[54] Table 1.10 then reports on GVA as a percent of gross value of output. Once again, the ICS-2002 had generated data so that this particular metric could be calculated and presented. Chowdhury (2007) had earlier on reported on values of this metric based on the ICS-2002 data.

[54] This category includes many of the largest leather tanneries and leather goods companies in Bangladesh.

Table 1.10: Gross value added as percentage of gross value of output, 2006/2007

Firm size classes	Gross value added relative to Value of gross output, per establishment, across three types of establishments			
	Own-account producers	Contract manufacturers	Others	All
Micro	26.98	52.43	23.93	47.33
Small	23.42	21.01	52.81	22.59
Medium	40.78	64.40		45.32
Large	55.13	60.46		56.95
MiSmall	23.44	22.98	37.25	23.33
MeLarge	50.85	61.11		53.95
All firms	48.02	55.60	37.25	50.38

Source: SMEF survey of six sectors, 2006/07

1.2.2.5 The Accuracy of Results from the surveys conducted for six sector studies

How representative are our own results compared with related results that are available in the literature? Are we able to compare these results *versus* another highly-regarded dataset.

We argue that the World Bank's Investment Climate Survey 2002 is one such source. That body of data can be compared with the results from in-depth surveys associated with the present six sectors, commissioned by the SME Foundation in 2008.[55] Results are from the two surveys are presented having the same format, in the interest of ready comparability.

Table 1.11 reports on sales, value added, no. of workers, labour productivity, capital employed and capital-output ratio for 977 firms surveyed during the ICS 2002. Labour productivity is equal to gross value added per worker. Capital employed is equal to the sum of value of all fixed capital and working capital. Capital-output ratio is value of capital divided by value added.

Table 1.11 Economic characteristics of micro, small, medium and large firms, 2002 (Unless otherwise indicated, financial values are in Tk. 000s)

Particulars	Micro	Small	MiSmall	Medium	Large
Sample size	34	195	229	127	621
Total sales	22177	28012.2	27145	75000.2	289013
Direct maerial cost	13033	18631.5	17800	51393.7	152994
Value added	9144	9380.6	9345	23606.4	136019
No. of workers	5.47	28.27	24.89	68.4	415.2
Labour productivity	1671.6	168.8	375.45	345.12	327.6
Capital employed	11879.8	25078	23118.6	120930	250283
Capital-output ratio (Tk.)	1.29	2.67	2.47	5.122	1.84

Source: Investment Climate Survey (ICS) data, 2002

Note: Sample size of the source is 977 establishments interviewed by Bangladesh Enterprise Institute (BEI) in 2002.

[55] The sector team leaders of the second study are Naeem Chowdhury, Momtaz Uddin Ahmed, K. Siddique-e-Rabbani, M. Kamal Uddin, Saleh Ahmed and M. Burhan Uddin. The overall team was led by Naeem Chowdhury, the team leader of the present implementation.

Table 1.12 reports on sales, value added, no. of workers, labour productivity, capital employed and capital-output ratio for 845 firms surveyed by the CDS team during the year 2008. Labour productivity is equal to gross value added per worker. Capital employed is equal to the sum of value of all fixed capital and working capital. Capital-output ratio is value of capital divided by value added.

Table 1.12: Results from the six sector studies surveys commissioned by the SME Foundation

(All numbers, unless said to the contrary, are measured in Tk. 000s)

Particulars	Micro	Small	MiSmall	Medium	Large	MeLarge
Sample size	121	465	586	229	111	259
Total sales	4978.4	25837.3	21530.3	74155.6	431476	210216.8
Direct material cost	2765.8	17634.0	14571.3	44646.2	234795.7	113010.3
Value added	2183.8	8200.9	6958.5	29485.1	196677.6	97183.7
No. of workers	5.7	22.7	19.2	49.3	319.9	169.8
Labour productivity	379.2	359.8	361.0	597.6	614.7	572.2
Capital employed	1894.1	8924.0	7472.4	65770.4	130489.9	108407.8
Capital-output ratio (Tk.)	1.05	1.01	1.01	1.26	0.58	0.97

Source: SMEF survey of six sectors, 2006/07

Note: These are results compiled from six reports recently prepared for the SME Foundation. Between the six sectors, 845 manufacturing establishments were surveyed and interviewed in very considerable depth. The sectors are (a) agro & food processing; (b) leather and leathergoods industry; (c) electricals and electronics; (d) leather & footwear; (e) light engineering and (f) plastics. The averages are all weighted averages.

Several similarities between the two sets of results are notable, as follows:

(1) Value added as a percentage of sales for the MiSmall class of establishments is found to be 32.3%. For the ICS-2002, this is found to be 34.4%. Considering that Bangladesh economy has become even more outward-oriented during the six intervening years since 2002, thereby increasing competitive pressure on the domestic manufacturers. That assessment is consistent with the take of value added's relative share in sales having fallen between 2002 and 2007. In contrast, for the large enterprises, value added relative to sales is found to have fallen between 2002 and 2007---from 47.1% to 45.5. Even so, the percentages yielded by the two surveys are strikingly similar. The point is that both survey samples seem to have been drawn from the same universe.

(2) Labor productivity (in thousand Taka worth of value added per worker employed) is found to be Tk. 375.45 thousands in 2002 as compared with Tk. 361.0 thousands in 2006/7. That is a striking similarity. Value added per worker is one of the most central empirical metrics when it comes to pro-poor development.

(3) With the exception of micro class of firms in the ICS 2002[56], the number relating to average sales for the small and medium class of firms between the two surveys are also

[56] ICS 2002 had heavily under-represented micro establishments. It is also clear, with only 34 out of 977 firms (or only 3.4%) that the micro establishments on ICS 2002 sample were skewed towards buying

pretty close indeed. Thus for instance, average sale for the small firms was found to be, respectively, Tk. 28 million and 25.8 million in 2002 and 2007. Again, average sale for the medium firms was found to be, respectively, Tk. 75 million and 74.1 million in 2002 and 2007. These are striking similarities, and serve to generate strong confidence in CDS team's dataset being representative of earlier work. Both samples seem to have come from the same universe.

(3) Both surveys show that the MiSmall establishments register significantly higher capital productivity versus medium-sized firms---by returning lower or much lower capital-output ratios on an average compared with medium firms. (In both surveys, large firms are more capital-productive *versus* medium firms.)

It is reassuring that the more recent 2006/2007 survey, which has a somewhat smaller sample size than the ICS-2002, yields results that are often very similar compared with the latter. This is because, on a close examination, it was found that there is a close correspondence, for example, between the average enterprise employment size across the firm-size structure reported by the ICS 2002, as compared with the findings from the Economic Census, 2001/2003, conducted by the Bangladesh Bureau of Statistics (BBS). BBS reported an average employment size of 66.7 in 2001/2003 for medium enterprises, whereas the ICS data put that average at 68.4--- a statistically insignificant difference indeed (Chowdhury, 2007b). The BBS reported an average employment size of 389 in 2001/2003 for large enterprises, whereas the ICS data put that average at 415--- a difference of 4 or 5 percent, which is small. The quality of data in the 2006/2007 surveys of the six sectors thus appears, mostly, to be representative of the same 'universe' as the ICS-2002.

1.2.2.6 Presenting a baseline for the Leather and Leathergoods sector

By blowing up from our sample estimates to the level of the relevant statistical universe, we obtain a kind of baseline data for the sector. We blow up by multiplying sample average value added by the number of establishments in the entire economy. Before proceeding any further, we need to briefly describe how we arrive at the number of establishments in this industry in the economy overall, and the problems that attach thereto for the purposes of this particular blow-up exercise.

The BR-2007 gives the number of establishments in small, medium and large size classes in the entire economy. But it does not do the same for the micro firms. The Economic Census 2001/2003 does that. We use compound annual growth rate for small firms between 2001/3 and 2007 --- a passage of some five years --- as the basis for extrapolating the number of the micro firms overall in this industry. Those numbers are then presented in Table 1.13. That said, however, the resultant value of the size of the leather and leathergood sector in terms of overall value added is found many times larger compared with the size of the sector according to BBS' national accounts data. This means most probably that the inclusion of the number of micro firms from the Economic Census 2001/2003 severely overstate the baseline.

houses and other 'high-value' niche sectors. Whereas the CDS team had 14.3% of its sample in the form of micro establishments.

Table 1.13: Bangladesh's leather and leathergoods industry, 2006/2007: the baseline

Firm size classes	Gross value added per unit (Tk. million)				Number of establishments in Bangladesh (No)	Gross value added Bangladesh (Tk. billion)
	Own-account production	Contract manufac-ture	Others	All		
Micro	1.7	4.1	2.7	3.7	1571	5.81
Small	41.8	6.4	5.1	12.6	509	6.41
Medium	94.7	78.1	0.0	124.0	100	12.4
Large	15.6	607.1	0.0	672.4	20	13.44
Total value added in Bangladesh leather industry						38.06

Source: SMEF survey of six sectors, 2006/07

1.3 Enterprise-cum-entrepreneurial profile of the leather and leathergoods industry

By incumbents, we mean prominent leaders of the industry in question. That said, however, the Team had proposed that only about 12 or so large establishments in the **leather and leathergoods** industry would be surveyed. (And the SMEF had concurred with this proposal.) The presentation of the incumbents in the following would therefore be confined to five or six among the most prominent of the establishments surveyed, including several of the largest of the establishments surveyed. The presentation would largely be cast in terms of the business development capabilities of these incumbents. We shall single out only one business development capability. That capability essentially comes in essentially three flavours. First is the development capability of ensuring growth of the employment size. The second is the development capability of ensuring growth of retained earning. The third is the development of capability of ensuring growth of sales. With this in mind, we present five case studies of entrepreneurial 'movers-and-shakers' of the **leather and leathergoods** industry of Bangladesh.[57]

1.3.1 Case 1: A clothing apprentice to a leading design cast in the designer industry

The first case study in the leather and leathergoods industry is about a man who is about 58 years of age. Whereas he started his working life around 1968 as a person who used to sell hides to the proprietors of tanneries in Dhaka. Hailing from the south-eastern part of Bangladesh, namely, the district of Noakhali, the man was quick-witted, ambitious, and wily. Through the referral of a cousin who had lived in the then West Pakistan and had thus become somewhat fluent in Urdu for an East Pakistani, this man struck up first a conversation and then a transactional contact with the Urdu-speaking owner of a tannery. This was not really a big deal of a tannery. But then, as a supplier of chemicals, our hero was not a big deal either. The four years in the run-up to the onset of the War of Liberation for Bangladesh was some kind of a virtual nursery for our man, who was learning new things almost daily about the 'chemicals

[57] It is in the best tradition of empirical research that these profiles will be anonymous, and that no names will be named. The names of the entrepreneurs to be used will be fictitious. And, yet we want to confirm that each of these five case studies are the whole truth, and nothing but the truth.

business.' After all, there was much to be learnt about the chemicals business. He had to know the names of the chemicals. Sometimes, the chemicals were christened differently by the people in Hazaribagh than they were called in the textbooks. And the proprietors had their own epithets for some of the choicest chemicals and, unless you were able to pronounce those chemicals just as the bosses wanted to hear them pronounced, you were not likely to secure their chemicals custom. Then you would be out of business and eventually out of Hazaribagh.

His opportunity spawned during the War of Liberation. Import channels were disrupted, domestic supplies became hard to find, prices spiked, and those who had their hands on a cache of supplies of chemicals simply minted money. Our subject was still not well capitalized: so he couldn't capitalize on the opportunities.

Soon after the liberation, the mills and factories owned by non-Bengalis were nationalized, and Bangladesh Tanneries Corporation (BTC) was incepted. People who were sent by the BTC to run tanneries had never in their lives seen a liming drum in a running tannery, as had not the Deputy General Manager, Purchase. Chemicals were costly to trade amid the runaway inflation t hat enveloped Bangladesh from 1973 onwards, and he didn't have much capital. Sensing a need to change and start over, our subject changed tacks and started to supply hides. With a penchant for 'jaw-boning', he was soon buying low and selling all manners of hides. It helped greatly that the purchase *babu* were all illiterate hide-wise, and could not tell a prime hide from a fake. Greasing the wheels of sleaze without any scruples, and through rampant 'buying-low-and-selling-high', our subject accumulated a capital that a short five years before would have been far removed from his wildest dreams. The fortune was still well shy of a million Taka. But for him---a man with no even a matriculation---to have cash of more than Tk. 150000 in 1975 was nothing short of break-taking.

Our subject went to playing the hides market. In the late 1970s, he bought his first stake as a partner in a small tanneries that, facing hard times, decided to sell over. He was one of four partners, all from Noakhali. Those days, cash-gains in tanning were pretty decent. In fact, the profitability was so high that outsides, to whom Hazaribagh was a filthy, squalid, stinking backwaters, could never imagine the financial flourish and bloom with which this place was suffused. Within ten years, each of his three partners had sold out, and in each case he was the buyer of the departing stake.
Today, our subject, a once humble trader is a multi-millionnaire owner of several tanneries. This is true rags-to-riches story.

1.3.2 Case 2: From a home-tutor to an design goods industry icon: a second case study leather and leathergoods.

1.3.3 Case 3:

1.3.4 Case 4: A clothing apprentice to a leading design cast in the designer industry

1.3.5 Case 5: A clothing apprentice to a leading design cast in the designer industry

1.4: Technology Platform in Use in Leather and leathergoods industry

1.4.1 The technology platform in use

By technology platform, we generally mean the production techniques in use, the factor proportions prevalent in these vertical industrial sectors, bearing in mind that we shall need to use an acceptable definition of technology.

1.4.2 Technological and Quality Upgrading

Technological capability is a competitive differentiator of critical importance. This is especially true when the world of production and competition is a global village. China and India, especially China, is not just attracting very large dollops of foreign direct investment but also large and medium multinational companies who are eagerly transferring proprietary technologies to China and then training up the Chinese in using sometimes quite advanced technologies. That has raised the bar quite significantly for the competition, including what is a potential competition with a "long-shot" such as Bangladesh. This is why technological upgrading is exhibit number 1 when it comes to "binding constraint". This is no longer a time for banal platitudes, of the kind that many government and donor pronouncements are made of. Nothing short of a very determined effort to draw level with, sometimes even leap-frog, a deadly serious competition is called for.
Technology embraces (i) manufacturing process; (ii) product functionality, durability and user convenience; (iii) product aesthetics; and finally (iv) the aesthetics and environmental dimensions of product packaging. Technology can-do that makes a difference thus is a versatile and challenging package. Stanford University technology historian Professor Nathan Rosenberg called science *papyrocentric*, something that loves publicity, but technology *papyrophobic*, something that loves anonymity. Profitable technology demands diligent digging and is inherently costly, because it is largely proprietary. The market for proprietary resources is always prone to imperfections, either because sellers have an insurmountable informational advantage, or because demand, discouraged by high prices characteristic of low initial volume, never picks up: a case of information asymmetry again. Asymmetries in access to credit markets --- another permanent fixture of under-development --- compounds the first problem. Plugging the competitive technological gap afflicting especially small enterprises will require accent on (i) attracting foreign direct investment (FDI) of the right kind; (ii) negotiation of minimalist "local-content" guarantees through the Board of Investment; (iii) scoping, and providing seed-money for, applied R & D under the aegis of the SME Foundation and the DCCI, for instance; (iv) determining requirements and funding for creating and/or augmenting the infrastructure of R & D, to name the four that come to the mind instantly. All of that will put a premium on deliberate, resolute and informed public interventions, including public-private partnerships, all executed cost-effectively and flawlessly. No doubt, in discharging that mandate, catalysts and providers will all require building of their own capacities, for conception, discovery and implementation. Above all, political will, at all levels of governance --- within the government, in the civil-society organizations, in the private sector---will need to be stirred, marshaled and then aimed at this binding constraint. Technical universities, research institutions, training institutions will be better equipped and empowered to strengthen their R&D profiles from the perspectives of potential private sector

adopters. The SME Web Portal will be leveraged up to the hilt for this end. Institutional reforms in terms of sharing the risks and returns to innovation between the private, often young, inventors/innovators and civil-society organizations, using market-friendly trade-off schemes will need to be experimented and then gradually brought into the mainstream.

1.4.3 Production technique in use in the Leather and leathergoods industry

Table 1.14 is about the variety of production techniques in use in the industry. It shows the average number of machines of various kinds that are employed in the leather and leathergoods industry of Bangladesh.

Table 1.14: The diversity implicit in the technology platform in the Leather and leathergoods industry

(No. of machines/equipment per establishment in each category of firms)

Firm size classes	Average number of machines per establishment				
	Wet Blue	Wet Blue Crust	Finished	Leather goods & footwear	All
Micro	4.09	1.06	1	0.0	6.15
Small	4.37	1.31	1.64	2.61	9.93
Medium	14.20	1.80	1.33	4.62	21.95
Large	22.21	2.35	1.50	61.76	87.82
MiSmall	4.32	1.29	1.61	2.61	9.83
MeLarge	17.04	1.99	1.40	28.79	49.2
All	7.92	1.58	1.50	22.06	23.3

Note: The numbers in the foregoing table are based only on the number of 'core' machines, both those bought new or in used condition. The number of auxiliary tools and devices has not been included in this calculation.

Source: SMEF survey of six sectors, 2006/07

The manufacturing establishments in this industry essentially belong to five major categories, namely, (i) leather tanning (BSIC 1911 and 1929); (ii) footwear (BSIC 1921); (iii) ladies' and mens' designer leathergoods (BSIC 1912).[58]. The products of these businesses include wet-and-blue intermediate leather, crust leather, finished leather. They also include footwear, ladies' bags, mens' wallets, belts, cardholders, diaries, and the like.

The main pieces of equipments that are used in this industry are (i) ; (ii); (iii); (iv); (v); (vi). There are some 25 or so 'tier one' tanneries that are fitted out, equipment-wise, for handling prime hides and skins and mostly produce fully-grained leather. These are the ones that account for more than 60% of all leather exports from Bangladesh. Their core equipment are mostly sourced from Italy and Germany. China is also incrementally entering into the radar screen of the domestic tanners as a supplier of equipment.

Several results arise from this table. Firstly, it is clear from this table that leather goods and footwear dominates the other niches within the industry in terms of the average

[58] Four-digit BSIC codes for the leather and leathergoods industry are 1911, 1921, 1912 and 1929 (BBS, 2001, p. 11)

number of equipment and machines. Secondly, the equipment that are required in converting hides into wet-blue preparation are quantitatively the next most populous category of equipments in use in the industry. These are equipment that are fed the hides that have been processed in salted or brimy solution and after they have been de-haired and de-fleshed.

Thirdly, we define the technology platform for each type of establishment as a statement of capability expressed in the number of various machines and equipment. For each type of machines/equipments, we witness a predictable scaling up of the technology platform as we move across from the smallest establishments --- the micro --- to the largest establishments on the sample. This is intuitive, of course.

Table 1.15 presents the average replacement costs of these categories of machines. Before proceeding any further, it is necessary to appraise oneself about how these replacement costs were evaluated. During the survey, we assessed the value of capital equipment in three ways, namely, 'replacement' cost, 'resale value' and (historical) acquisition cost. The question asked of the respondent while evaluating the replacement cost was: "What would it cost today were this piece of equipment, as it is, were to be purchased today?" The question is quite straight-forward where new equipments are concerned. But what about used machines? Now, experienced entrepreneurs or chief technologists typically have an idea about what a given piece of equipment would likely cost in today's prices. Unless the industry manufacturing that particular piece of equipment were characterized by a high rate of technological obsolescence, such ideas would likely also be fairly accurate. Our Survey Research Analysts (SRAs) were typically able to develop a warm rapport with our respondents. People largely cooperated. Thus, we were able to generate a fairly accurate characterization of the investment in fixed investment in plant and machinery (not counting value of land, building and structures) by these establishments. It would be recalled that the SME Policies Strategies 2005 stipulates that establishments with up to Tk. 15 million worth of plant, machinery and equipment (not counting value of land, building and structures) should be treated as 'small'. And establishments with between Tk. 15 million and Tk. 100 million worth of plant, machinery and equipment (not counting value of land, building and structures) should be treated as 'medium'. Now that we have this data relating to replacement cost on hand, we shall now be able to classify sample observations according as whether they are 'micro or small' or 'medium', from the perspective of SME Policy Strategies 2005.[59]
Several findings from this table rate a mention.

Firstly, footwear and leathergoods segments of the industry represent the most expensive segments of the leather and leathergoods industry. These machines are the work-horses of hundreds of workers per enterprise that works in that segment.
Secondly, finishing too is a pricey segment of equipments, in which a typical assortment of finishing equipment costs some Tk. 2 million to equip. Establishments that are mainly in the business of tanning hides up to wet-blue crusts take on average the next most to fit out with equipment, at Tk. 1.37 million a pop. Lastly, firms that only tan up to wet-blue stage of chrome tanning and then cash in by selling their handiwork to crusters are at the bottom of the replacement cost heap, costing Tk 316 thousand a pop only.

[59] Bangladesh Better Business Forum (BBBF) has recently mooted another definition of 'small' and 'medium' enterprises. This definition is presented in Chapter-2 of this set of reports.

Table 1.15: Equipment replacement cost per unit in the leather and leathergoods industry

Firm size classes	Average price of different machines (Tk. 000s)				
	Wet Blue	Wet Blue Crust	Finished	Leather goods & footwear	All sectors
Micro	253	1191	1000	0	775
Small	323	1248	2173	535	991
Medium	399	1530	1697	5395	3039
Large	239	1583	2223	476	994
MiSmall	313	1243	2122	535	973
MeLarge	322	1549	1920	3234	2191
All	316	1371	2015	2513	1563

Source: SMEF survey of six sectors, 2006/07

Note: All numbers in the foregoing table are based on replacement costs of the equipment

Foregoing two table enable us to estimate total replacement cost of all plant and core machinery in use in the industry. This is presented in Table 6.16.
We need only be brief to describe the situation portrayed by Table 21. It is found that using footwear and leathergoods-producing machines to create custom-designed shoes, sandals, ladies' bag, executive diaries and the like is the mainstay---even the entire bulk---of the leather and leathergoods industry. Overall, as the next table shows, about 88% of all investment in plant and machinery in this industry comprises of footwear- and large leathergoods-making machines of the automated kind. Leather finishing comes in at a very distant second position, with a minuscule 5 odd percent of the total investment in plant and machinery.

Table 1.16: Total replacement cost by types of tanning and leathergoods technology setup, 2007

Firm size classes	Replacement cost of plant and machinery by types of equipment setup (Tk. 000s)				
	Wet Blue	Wet Blue Crust	Finished	Leather goods & footwear	Total
Micro	1034	1262	1000	0	3296
Small	1411	1635	3564	1398	8007
Medium	5672	2754	2257	24924	35607
Large	5318	3721	3334	29382	41755
MiSmall	1356	1604	3417	1398	7774
MeLarge	5822	3083	2687	93119	38681
All	2500	2166	3022	55435	23228

Source: SMEF survey of six sectors, 2006/07

Table 1.17: Percentage structure of investment cost per firm by types of firm, 2007

Firm size classes	Percentage distribution of total cost of machinery by size classes of establishments				
	Wet Blue	Wet Blue Crust	Finished	Leather goods & footwear	Total
Micro	31.36	38.29	30.34	0	100
Small	17.62	20.42	44.51	17.45	100
Medium	15.93	7.73	6.34	70	100
Large	12.74	8.91	7.98	70.37	100
MiSmall	17.45	20.63	43.95	17.98	100
MeLarge	5.56	2.94	2.57	88.93	100
All	3.96	3.43	4.79	87.82	100

Source: SMEF survey of six sectors, 2006/07

Table 1.18 presents information about the use of, and terms of the use of, land as a production input from the perspective of the establishments on our sample. Several findings rate a mention. First, 70% overall of the entrepreneurs own the land on which their leather businesses are conducted. MeLarge firms out-own land *versus* the MiSmall firms. Overall, a little over 37 decimal of land per firm is used. Again, MeLarge out-use MiSmall firms by almost 3.5 times. The average value of the land owned by those who own their land that is used in connection with this business is Tk. 50 million per owner.

Table 1.18: Utilization and valuation of land resources used on the sample

Firm status	Particulars regarding land						
	% of cases owning land on which business done	% of cases renting land on which business done	% doing both	land use per firm (deci)	amount lease/ Month	Amount given at once (in 000 tk)	Value of own land in 2007 per firm (Tk. million)
Micro	75	25	0	12.69	1156.3	2.5	20.27
Small	58.90	39.72	1.36	21.70	18980	17.32	35.59
Medium	76.66	30.43	0	36.98	2250	5.67	37.80
Large	95	0	0	123.04	0	0	121.83
Mi small	61.79	37.07	1.12	20.082	15780	14.67	32.15
Melarge	84	14	0	69.255	1350	3.4	74.43
All	69.78	28.77	0.71	37.3	10590	10.61	50.89

Source: SMEF survey of six sectors, 2006/07

1.4.4 Capital-labour ratio, Average Physical Product (APP) and Marginal Physical Product (MPP)

Factor proportions---the proportions in which labour and capital are utilized in production by the establishments --- constitute an important dimension of a narrative concerning the technology platform in any real-life industry. Bangladesh is a labour-surplus but capital-deficient economy. The use of capital relative to labour is therefore emblematic of how parsimoniously is capital combined with the relatively surplus labour in an effort to create value-added in manufacturing. Motivated thus, we have estimated capital-labor ratio for the sample. The measure of capital in this context is always based on the fixed capital used by the establishments. By fixed capital, we mean replacement cost of plant and machinery, plus the value of other support capital stock (such as vehicles, generators, furniture and fixtures, and the like).

Economic theory suggests that both labour and capital productivities depend upon the factor proportions that are binding. Certain production processes---such as fertilizer, steel, etc. --- are inherently machine-paced, requiring high degrees of mechanization and high ratios of fixed capital to labour used. These processes are more likely to be relatively integrated production technologies. Certain other production processes represented inherently more fragmented technologies, with different factor proportions in different segments of the plant. For instance, while the manufacture could use relatively little automation, packaging might involve high degree of mechanization and automation. In Bangladesh, the preparation of processed food increasingly resembles this narrative. Be that as it may, the point that seems presently important is to stress that factor productivities closely correspond to factor proportions, and have therefore to be discussed in combination.

The theory is that capital is the scarce factor of production and labour is the relatively abundant factor of production. More mechanized techniques of production represented by more modern and faster and more sophisticated machinery set up cost more to create and therefore to acquire. In theory, a production process of which the factor proportions are relatively higher compared with another one embodies more capital and technology resources per unit of labour---the abundant resource--- and ought therefore to produce more per unit of time. This is why it is imperative to glean an idea of where the factor proportions are in any study industry.

Table 1.19 shows the factor proportions prevailing in Bangladesh's leather and leathergoods industry. We find that capital labour ratio averages at Tk. 233 thousand. This ratio peaks at Tk. 289 thousand for the medium firms.

1.4.5 Average Physical Productivity (APP) of Labour and Machine

Table 1.19 also shows average physical productivity of labour and machines prevailing in Bangladesh's leather and leathergoods industry. Physical outputs have been evaluated in units of 'homogeneous output', after duly using price relativities in constructing 'index number' like facilitators. The third and fourth columns of Table 24 report on physical productivities of labour and number of machines.

Table 1.19: Capital-labour ratios and physical productivity in Bangladesh's Leather and leathergoods industry, 2006/2007

Enterprise Status	Capital-labour ratio (Tk. 000s)	Labour productivity per worker (in physical 'homogeneous' units)	Machine productivity per machine (in physical 'homogeneous' units)
Micro	283.5	3081.89	6415.75
Small	248.8	3888.02	9533.60
Medium	289.1	6045.95	6045.95
Large	67.26	3502.23	18023.09
Mismall	255.0	3780.53	9216.53
Melarge	194.5	5028.47	15389.02
All firms	233.3	4279.71	11953.39

Source: SMEF survey of six sectors, 2006/07

Several findings deserve being expanded upon. First, capital-labour ratio is found to fluctuate between the 'micro' and 'large' establishment classes. The average capital-labour ratio of the MeLarge establishment class is lower than the corresponding number for the MiSmall establishment class by about Tk. 60.5 thousands. The difference is statistically significant. The next column in Table presents (weighted) Average Physical Product in units of the homogeneous output for the industry. This is merely obtained by dividing, for each size class, total physical output by the corresponding sum of firms' employment. Similarly, average machine productivity is obtained by dividing, for each size class, total physical output by the corresponding sum of firms' number of core machines. Overall, we find that a worker produces 4280 units of physical output in a year. An average machine produces 11953 units of output.

Before proceeding any further, we would like to say a couple of things about why the APP appears to vary somewhat erratically from one size class to the next.

The estimate we get in homogeneous-output unit depends upon the output-mix itself. And because we obtain homogeneous-output unit by using price relatives between the 'benchmark' product segment and other comparator segments, the quality of the output in those segments also becomes privy to the estimates we get of the homogeneous-unit output. Having regard to this caveat, we note that MiSmall and MeLarge firms score quite differently when it comes to Average Physical Product---3780.53 *versus* 5028.47 units of homogeneous output. When it comes to Average Machine Product (AMP), MeLarge establishments open up an edge *versus* the MiSmall establishments. The margin of the MeLarge's advantage is of a non-negligible 28%.

1.4.6 Marginal Physical Productivity

Having discussed the technology platform in some detail, we now move on to characterizing technologies in terms of their underlying production-function characteristics. To do so, we shall need estimates of $\frac{dQ}{dL}$ and $\frac{dQ}{dM}$, where Q relates physical output, L denotes employment and M denotes the number of machines. We simply invoke ordinary least-square regressions of Q over L and M respectively in order to estimate the foregoing marginals. That is, these two are simply the estimates of the coefficients obtained by regressing Q on L or M, as the case may be. Estimates of these two marginals across firm size classes are presented in the second and third columns of Table 1.20. Such marginal are however not scale-neutral. The concept of elasticity is however scale-neutral---that is why we have also calculated the elasticities of output, at arithmetic mean level, corresponding to labour and number of machines, and presented them in the last two columns of Table 1.20. The results are self-explanatory.

Table 1.20: Productivities, elasticities with respect to labour and number of machines, leather industry, 2007

Farm status	Marginal product of labor	Marginal product of machine	Elasticity of output with respect to labour	Elasticity of output with respect to labour
Micro	22.89	3398.05	.009	1.139
Small	5489.73	3364.52	1.078	.330
Medium	20664.60	30.87	3.068	.002
Large	714.04	100.34	.216	.022
Mi small	5586.42	4063.15	1.075	.405
Melarge	1563.32	1042.77	.35	.16
All	2403.93	2678.71	.48	.357

Source: SMEF survey of six sectors, 2006/07

1.4.7 Cobb-Douglas Production Function

At this stage of our presentation, we need to factor in a comparative discussion of the specifications of different production functions and what they mean in terms of important attributes of the representation of the technologies involved in the various industries in question.

No discussion of physical productivities can proceed very far before invoking tried and tested concepts of production function, such as Cobb-Douglas (CD) or Trans-log (TL) production functions. These production function provide a representation of the production technology that underlie the actual situation of a given sample of firms. To a discussion of these two classes of production as established by our data that we now turn.

CD has been the functional form of a production function of the longest standing in the applied economic literature. This well-known function is represented by the formulation:

$$Q = AL^{\alpha}K^{(\alpha-1)} \quad \text{...}(1)$$

Where Q represent the level of output;
A represents, in an abstract sense, the state of the technology;
L represents the amount of labour used by the technology;
K represents the amount of capital used by the technology.
With a suitable logarithmic transformation of the equation (1), we get

$$Ln(Q) = LnA + \alpha LnL + (\alpha-1)LnK \quad \text{......................................}(2)$$

Alternative production functions include the Cobb-Douglas and CES (Constant Elasticity of Substitution) production functions. The Cobb-Douglas production function is given by:

$$\ln Q_i = \beta_0 + \sum_j \beta_j \ln X_{j,i} + \varepsilon_i$$

All inputs are preferably to be measured in physical units. Thus Q will be measured for the goods industry using physical units (eg sq.-ft, for instance), L will be measured using person-years and capital in capital-years.

With a CD production function, the returns to scale is unity, and the elasticity of substitution between labour and capital is also equal to unity. There have been a large number of studies using Bangladeshi data of whether the Cobb-Douglas formulation remains a relevant representation of the underlying technological relationship between input and output in several industries. Thus for instance, Ahmed (1992) has researched the returns to scale in manufacturing in Bangladesh using the CD formulation. As well, Chowdhury and Ahmed (1999) have estimated returns to scale in several industries using the CD formulation.

A more flexible form of production function that is worth considering here is the Trans-log Production Function. The most frequently used is a translog function, which is a second order (all cross-terms included) log-linear form. This is a relatively flexible functional form, as it does not impose assumptions about constant elasticities of production nor elasticities of substitution between inputs. It thus allows the data to indicate the actual curvature of the function, rather than imposing *a priori* assumptions. In general terms, this can be expressed as:

$$\ln Qi = \beta 0 + \sum_{j} \beta j \ln Xj, i + \frac{1}{2} \sum_{j} \sum_{k} \beta j, k \ln Xj, i \ln Xj, k + \varepsilon i$$

where $Q_{j,t}$ is the output of the establishment j in period t and $X_{j,i,t}$ and $X_{j,k,t}$ are the variable and fixed establishment inputs (i,k) to the production process.

1.4.8 Empirical Implementation of the Production Function

Of both the CD and TL production functions, we implement two versions each. The first of these is a traditional CD functional form, in which output is said to be a function of just labour and capital. Labour in this case is about all kinds of labour, including the white collar workers too in the mix. Capital is about fixed capital, about which we have had occasion to say quite a few things already. The alternative functional form throws into the melting pot a third variable, namely, the sumtotal of material inputs. Such inputs include raw materials of all kinds that have been used in production. We estimate each of the production functions in one of three alternative versions, the chief differentiator among these three is whether we measure the 'output' in physical or value terms. Where output is in physical terms, the dependent variable is measured in units of the homogeneous-output already talked about. In that case, labour and inputs are also measured in physical terms---labour in person-years, and input in units of homogeneous-inputs.[60] Fixed capital is always measured in monetary terms. When it comes to estimating the production function in TL forms, having three explanatory variables mean that there are in all nine variables on the right hand side of the production function form (not counting the constant term). The following table presents the estimates of the coefficients of both forms of the production function.

Table 1.21: Coefficients of production functions (of various kinds), 2006/2007

Explanatory variable	Cobb-Douglas				Translog			
	Version 1		Version 2		Version 1		Version 2	
	Coeff.	t statistic	Coeff.	t statistic	Coeff.	t statistic	Coeff.	t statistic
Const.	3.98*	7.11	.54*	6.59	5.68*	7.39	4.10*	3.41
Ln(L)	.75*	6.90	.55*	5.20	.41	1.14	.56	1.43

[60] Once again, we use price relatives, this time for inputs, in order to 'chain' comparator inputs into units of 'benchmark' input.

Explanatory variable	Cobb-Douglas				Translog			
	Version 1		Version 2		Version 1		Version 2	
	Coeff.	t statistic	Coeff.	t statistic	Coeff.	t statistic	Coeff.	t statistic
Ln(K)	.41*	5.46	.38*	5.40	.49	6.3	.41*	5.61
Ln(I)			.17*	4.57			.21	1.32
$Ln^2 L$					-.277*	-3.05	-.31*	-3.05
$Ln^2 K$					-.11*	-3.73	-.06*	-2.34
$Ln^2 I$							.053*	3.33
lnL. lnK					.17*	3.06	.19*	3.78
lnL. lnI							-.03	-.82
lnK. lnI							-.04*	-2.93
R^2		.61		.66		.60		.71
F-statistic		109.15		82.84		40.01		32.06

Source: SMEF survey of six sectors, 2006/07

Estimates of the regression coefficients from a CD functional form are also estimates of the elasticity of the function with respect to those arguments of the function. Output has an elasticity of 0.75 with respect to labour, and of 0.41 with respect to capital. The F-ratio---which is a summary measure of how well-specified the functional form under review is for the data on hand for the most parsimonious form of the CD function is the higherst, at 109.2. After we throw 'input' into the mix, the F-statistics, although still large, fell.

According to the Cobb-Douglas specification, the returns to scale is constant. Both coefficients are highly significant and intuitively signed. The TL function too is fairly well-behaved, with most of the coefficients being intuitively signed and statistically significant. The TL set of results suggest that the returns to scale are slightly increasing.
TL functional forms do not add to the r-squarred, but subtract from the F-ratio. We seem to have a trade-off to make.

1.4.9 Estimating returns to scale in the leather and leathergoods industry of Bangladesh

Some production functions are linearly homogeneous of degree one. A production function is linearly homogeneous of degree one when doubling the quantity of each input in the production function also doubles the output that can be obtained from it. Alternatively put, the returns to scale on a linearly homogeneous production function of degree one are also unitary. In such a case, returns to scale are also said to be constant. It is of some importance to be testing the foregoing two estimated production functions for the constancy of the returns to scale. It is now to this that we turn. We now test for whether returns to scale are constant in this industry. The steps adopted leading up to the test are as follows:

The hypothesis of constant returns to scale is $\hat{\beta}_L + \hat{\beta}_K = 1$
The F statistic for the hypothesis of a Cobb-Douglas model is

$$F = \frac{\left(\hat{\beta}_L + \hat{\beta}_K - 1\right)^2}{Var(L) + Var(K) + 2 \times Cov(L,K)}$$

The following about table shows that in both cases (of versions 1 and 2), the calculated value of the F statistics is much, much lower than the critical value. We can't reject the null hypothesis of returns to scale being constant and unitary for designer goods industry.

Sector	F statistic Version 1		F statistic Version 2	
	F value	Critical value	F value	Critical value
Leather industry	.019	2.69	.000756	2.69

For this industry, we find that the null hypothesis that returns to scale in it are constant can not be rejected. Increasing returns to scale are not proven for the leather and leathergoods industry.

1.4.10 Determinants of labour productivity

We next turn to the determinants of labour productivity and machine productivity across firms. The potency of these determinants is tested using ordinary least-squares regressions. The explanatory variables on which we regress estimates of labour and machine productivity, respectively, include the following:

(viii) Average product price;
(ix) Fixed capital per worker;
(x) Dummy variable taking the value of 1 if firm had taken a bank loan, and 0 otherwise;
(xi) Percentage of output exported;
(xii) Percentage of imported materials, parts and components in firm input-mix;
(xiii) Length of formal schooling on the part of the Managing Director
(xiv) Length of any specialized training attained by the Managing Director;
(xv) Three firm size dummy variables;
(xvi) Two location dummy variables, to correspond to location in Dhaka and Chittagong;
(xvii) Age of the firm.

Table 1.22 reports on the coefficients of running OLS regression of the foregoing functional form.

Table 1.22 : Determinants of labour productivity in the Leather and leathergoods industry of Bangladesh, 2006/2007

	Dependent variable is labour productivity measured in terms of					
	Physical output		**Gross value added in Taka**		**Gross value of output in Taka**	
	Coeff.	**t stataistic**	**Coeff.**	**t statistic**	**Coeff.**	**t statistic**
Const	4.266	3.248	2.548	1.5	6.995	5.467
age of unit	.121	.720	.173	.983	.166	.917
MD's education	.191	.621	.585	1.605	1.041*	3.177
ave. workers experience	-.122	-.545				
white collor workers	.166	.693			-.140	-.526

	Dependent variable is labour productivity measured in terms of					
	Physical output		Gross value added in Taka		Gross value of output in Taka	
	Coeff.	**t stataistic**	**Coeff.**	**t statistic**	**Coeff.**	**t statistic**
experience						
cluster	.202	.624				
bank loan dummy	-.596*	-1.996	-1.045*	-3.036	-.738*	-2.086
automated or manual dummy (manual=0)	7.491*	4.375	2.378*	1.617		
fixed capital per h.c.	-.02144	-.308	-.0931	-1.012	-.106	-1.26
% of output exported	-.009248*	-3.688	-.00938*	-3.117	-.01549*	-5.494
Input_import	-.00796*	-2.167	-.016*	-4.021		
own account dummy	.728*	2.636	.535	1.622	.789*	2.431
firm size dummy 1	.353	.596	.386	.704		
firm size dummy 2	.484	1.357				
firm size dummy 3	.516	1.416				
average product price	-.832*	-4.134			.426*	2.76
District Dhaka	.246	.674			-.570	-1.387
District Chittagong	.423	.740	.568	.933	.399	.627
R Square	.465		.458		.63	

Source: SMEF Survey, 2008

Table 1.23: Determinants of labour productivity in the Leather and leathergoods industry of Bangladesh, 2006/2007

	Machine productivity (output)		**Machine productivity (gva)**		**machine productivity (revenue)**	
	Beta	**t stataistic**	**Beta**	**t statistic**	**Beta**	**t statistic**
Const	.345	.304	1.022	.591	3.389	2.535
age of unit						
MD's education			.404	2.479	.232	.69
ave. workers experience	.431	2.248	.239	1.54		
white collor workers experience			-.385	-1.121		
cluster					.360	1.152
bank loan dummy	-.853	-3.361	-1.130	-2.991	-.615	-2.106
automated or manual dummy (manual=0)	15.130	8.297	7.510	3.046	6.373	3.386
fixed capital per h.c.			-.0990	-.886	-.106	-1.204
% of output exported	-.000606	-.237	-.0122	-3.52	-.00705	-2.655
Input_import	-.0125	-3.160	-.01505	-3.197	-.00910	-2.443
own account dummy	1.112	4.422	1.049	2.878	1.224	4.573
firm size dummy 1	-1.304	-2.387	-2.031	-2.030	-1.496	-1.950
firm size dummy 2	-.793	-2.893				
firm size dummy 3					.454	1.495
average product price	-1.181	-5.576	-.467	-1.668	-.389	-1.739
District Dhaka	.750	2.017			.533	1.485
District Chittagong	.147	.226	1.136	1.795	.551	1.032
R Square	.581		.601		.542	

Source: SMEF survey of six sectors, 2006/07

1.4.10.1 The need to deal with simultaneity bias in ordinary least-squares

It is typical in traditions of applied production research literature to estimate coefficients of production functions using a single-equation estimator. Many example of such a use of such a procedure can be found in the literature relating to manufacturing industries of Bangladesh. It needs to be pointed out categorically that the use of such a procedure leaves something to be desired. It has been well-established for sometime now that in specifications such as this one, the disturbance term is correlated with measured labour input or measured capital input. Because only the quantity of the measured labour or capital input enter the equation (1) or (2), the worker quality can only appear to be a part of the disturbance term. The quality or the relevance of experience, or the educational qualification of workers will frequently depend upon the spatial distribution of the supply of opportunities of educational or training upgrading. The supply of educational or training facilities, mostly a preserve of public or voluntary-sector activities, is treated as part of the disturbance term in equation (1) and (2). And yet it is incontrovertible that this supply is not without some effect on the quality or competency or relevance of the skills of workers, which are bound to affect the average or marginal productivity of workers in the study industry. The presence of correlation between the explanatory variable and the disturbance term in equation (1) thus is a tell-tale presence of a simultaneity bias in equation (1). This needs mitigation, if data relating to a suitable set of instrumental variables were to be found.

On another level, it is quite likely for the measured capital input to also be correlated with the disturbance term. Why? The selection of a best-practice stock of machines is desirable for everyone, but it takes a special skill, it takes experience, and it takes specialized knowledge. To the extent there is an active market to trade such skill or knowledge, such market is unlikely to have a national footprint but is quite likely to be concentrated in the capital city or the lone port city, squeezing the locations outside the capital or the port city. To put it differently, the spatial distribution of such markets of critical importance, which affects the productivity of capital machinery, will typically be treated as part of the disturbance term. The presence of correlation between the explanatory variable and the disturbance term in equation (1) thus is a tell-tale presence of a simultaneity bias in equation (1). This again needs mitigation.

More formally, in order to obtain a quantitative measure of the contribution of factors to firms' production, we need production function parameter estimates that are consistent. A firm with high total productivity---typically lumped with the disturbance term in the econometric estimation---will hire more labour and other variable inputs. This correlation between the productivity part of the residual (seen by the firm's manager, but not by the econometrician), and the observed values of the variable results in biased parameter estimates.

We shall therefore need to implement a two-stage procedure to purge the implementation of equation (1) and (2) of the presence of simultaneity bias: in short, we shall implement an instrumental variable approach. The instruments that we shall use are as follows:

(a) The number of public-sector colleges and universities within the jurisdiction of the districts whence our sample has come;

(b) The number of public and private training institutes within the jurisdiction of the districts whence our sample has come;
(c) The number of firms selling specialized professional services (providers of technical assistance) of one kind or the other within the jurisdiction of the districts whence our sample has come;
(d) The number of branches of banks and leasing companies within the jurisdiction of the districts whence our sample has come;
(e) The number of licenced micro finance institutions (MFIs) within the jurisdiction of the districts whence our sample has come;
(f) The number of business enterprises within the jurisdiction of the districts whence our sample has come.

Using these instruments, we conducted our Two-stage Least-Squares (2SLS) estimation of both of the production functions. However, the results obtained were much degraded compared with those obtained by plain least-squares estimates. These results are therefore not presented here to prevent result clutter. We shall therefore have to do with estimates obtained from ordinary least squares regressions of the production functions.

1.4.10.2 Estimating total factor productivity (TFP) in the leather and leathergoods industry **of Bangladesh**

Total Factor Productivity (TFP) is defined as the part of the output that results from what is over and above the quantities of inputs that can be measured. There are two main sources of growth, whether in an enterprise or the economy as a whole. One of these parts is called factor accumulation. Factors in this context correspond to labour, capital, raw materials, and the like. A certain, in fact a major, proportion of the product is owing to factor accumulation. However, there is a second component in output that can not be ascribed to the factor accumulation, but is instead a residual. This is the part of the output that is ascribable to other than factor accumulation. Nobel Laureate Robert Solow called this as due to technical progress.

TFP is calculated using a two-stage procedure that is an instrumental variable approach. The way in which it works is that in the first stage, the explanatory variables are regressed on a fairly large number of instrumental variables. The predicted values of the explanatory variables will be featured in the second stage of the exercise. The explanatory variables in the second stage will include not just measured fixed and variable inputs but also a whole group of relevant (shifter) variables that might conceivably influence the values of the endogenous variables. The residuals obtained at the second stage will be averaged over the sample to yield a average measure of total factor productivity---this is a measure of technical progress prevailing in the sector of interest. This value will lie between 0 and 1: the higher close to unity is the value of this TFP, the better is the state of TFP prevailing in the industry or sector in question.
Olley and Pakes (1996) provide an approach for handling this simultaneity bias, and Levinsohn and Petrin (2000) further enhance this approach.

Provisioning of assets---access to physical capital (such as plant and machinery, etc.), human capital (education, skills, technological cognitive abilities, etc.), financial capitall (debt, retained earnings, etc), social capital (brand power)--- and productivity are major factors behind productive self-employment. Variations in quantity and quality of provisioning of public goods --- spatial access and location, density of banking infrastructure, agglomeration benefits arising due to "clustering effects", the density of market channels, information and skills-building infrastructure, etc. --- usually are an important source of spatial variations. Many of these variables have putative effects on marginal factor productivities achieved by firms. And yet they tend to be lumped merely as part of the disturbance terms in most econometric exercises. These public goods translate into significant heteorogeneities among sample firms in total factor productivities (TFP)—an important growth source. These will be brought into the scope of the analytical work that we hope to do as instrumental variables.

Using these instruments, we conducted our Two-stage procedural estimation of TFP. However, the results obtained were much degraded compared with those obtained by plain least-squares estimates. These results are therefore not presented here to prevent result clutter.

1.4.11 Estimation of Stochastic Production Function

1.4.11.1 Efficiency gap within the sample of establishments

The production functions point up a summary picture which holds true for the sample in question as a whole. This same is true when it comes to estimates of the total factor productivity function---another set of summary results. These results appeal well when one is interested in sample-wide insights. If, as is quite likely, one is interested in intra-sample insights and results, estimates of production function strike one as if 'one is dressed well with no place to go'. One is in this uncomfortable position whenever, as now, diagnostic results and diagnostic insights are warranted. Here, one is interested in getting estimates of inter-firm 'scores' or 'ratings' even as one uses data on firms' output and inputs in an effort to see how the two stack up.

It is here that we, like many researchers before us, invoke the stochastic frontier function (SFF), which was first independently by both a Dutch team of econometricians, and also by Aigner, Lovell and Schmidt (1977). Subsequently, important work in this tradition was done by Kumbhakar (1982). The specification of the SFF is as follows:

$$\ln Q_{j,t} = \beta_0 + \sum_i \beta_i \ln X_{j,i,t} + \frac{1}{2}\sum_i \sum_k \beta_{i,k} \ln X_{j,i,t} \ln X_{j,k,t} - u_{j,t} + v_{j,t}$$

where $Q_{j,t}$ is the output of the establishment j in period t and $X_{j,i,t}$ and $X_{j,k,t}$ are the variable and fixed establishment inputs (i,k) to the production process. As noted above, the error term is separated into two components, where $v_{j,t}$ is the stochastic error term and $u_{j,t}$ is an estimate of technical inefficiency. Empirically, what we have done is as follows:

Using sample observations concerning measures of both output and input(s), and using Maximum Likelihood Estimators, we estimate coefficients of the corresponding coefficients that maximize the likelihood of observing the combinations of the output and inputs we have on our hands. Using estimates of the variances of both normally-distributed error and the half-normal error using values of sample observations, we estimate the stochastic frontier (Table 25). We then estimate the value of the efficiency, which we measure by value added, 'predicted' by the labour-capital combination for each sample observation. Ultimately, we then calculate for each firm its distance from the 'estimated frontier'.

The formulation is such that it is practicable to calculate the productivity deficit of each sample observation from the 'stochastic frontier' for the industry in question. This is how we plan to calculate the productivity gap of each of the clusters relative to the frontier production function estimated for that industry.
Using stochastic production frontiers in differentiating the firms on any given sample in terms of a well-accepted metric of firm performance is an oft-used method in applied industrial research. We, too, would be using such a method. We reproduce below work in which distance of sample of observations from an estimated stochastic frontier is regressed upon quite a number of explanatory variables in order to generate a diagnostic analysis of some value.

Table 1.24: Estimates of the coefficients of the stochastic frontier production function, using MLEs

Frontier estimate				
Coefficients	**least square estimate**	**t-value**	**Half normal estimate**	**z-value**
constant	3.98*	7.11	5.51*	1.500
β_L	.75*	6.9	.656*	6.95
β_K	.41*	5.46	.365*	5.58
σ_v			1.107	
σ_u			.038	
σ	1.121		1.10	
λ			.034	

Source: SMEF survey of six sectors, 2006/07

1.4.11.2 The Drivers of Estimated Technical Inefficiency

Following the lead of the analytical model developed in Annex-II and using estimates from Table 25 of the standard errors of the two components of the error term---one distributed as a normal variate and the other distributed as a truncated, half-normal variable, we estimate the 'distance' of the value added registered by each sample observation (which is a kind of measure of efficiency) from an estimated stochastic production frontier. We then regressed this distance on a number of behavioural or strategic choice variables, such as opting for (or obtaining a) bank loan, fixed capital provisioning per workers, average product price, etc. The explanatory variables on which distance from the frontier is regressed include the following:
EDUC= Number of years of schooling of the Managing Director's formal schooling (natural log of years);
PER_EXP = % of the firm's output that is exported;
CHT_DUM = A dummy variable that takes the value of unity for Chittagong and zero everywhere else;
DHK_DUM = A dummy variable that takes the value of unity for Dhaka and zero everywhere else;
AV_P_PR = Average product price (natural log of Taka);
B_LOAN = Bank loan;
AGE = Number of years since the establishment of the firm;
The following table presents the results obtained from the regression analysis:

(1) Having a bank loan significantly increases distance from the production frontier: bank loans cause a loss in efficiency in this industry compared with firms that are more internally financed;
(2) A high intensity of imports in the use of inputs is found to significantly increase distance from the production frontier. Because value added is used in evaluating output in the underlying stochastic frontier production function, and because there is a connection between value added and intensive use of imported material, [61] a higher import intensity in the input-mix causes a loss in efficiency in this industry compared with firms that are better adjusted to the use of domestically produced inputs.
(3) Now we take up the factors that reduces the distance from the frontier. We find that capital-labour ratio is one such variable. The higher is the amount of capital that a worker has to work with, the smaller is the distance from the frontier. The coefficient of capital-labour ratio in the distance function is highly significant.
(4) The educational attainment of the Managing Director too has a negative coefficient on the distance function.

The results demonstrate that one can harness relatively advanced methods and still discover results that have compelling implications for formulating policy stances. For instance, the finding that increasing fixed capital provisioning is one of the ways in which it is practicable to enhance 'efficiency' in this industry should lead policymakers to actively think of ways in which the capital provisioning of small establishments might be enhanced. The knowledge that increasing import intensity is one of the ways in which it is practicable to degrade 'efficiency' in this industry could lead national manufacturers to think of ways in which domestic production of chemicals and other tannin agents might be enhanced. However, this would rarely be practicable unless the Government were to adopt a more promotional policy stances towards the kind of domestic manufacturing that over time can acquire comparative advantage.

Table 1.25: Determinants of the distance from the estimated stochastic production frontier

	B	t
(Constant)	3.653*	2.422
capital labor ratio	-.486*	-4.015
average product price	-.069	-.480
MD's education	-.456	-1.442
% of output exported	.0050	1.440
Input_import	.0151*	2.975
firm size dummy 1	-.736	-.931
firm size dummy 2	.195	.398
firm size dummy 3	-.488	-1.003
District Dhaka	.216	.533
bank loan	.0735*	2.373
R-squarred		.374

Note: One asterisk shown in the column labeled 'T-stat' shows the variable is significant at 5% error probability level; two shows significance at 10% error probability level

Source: SMEF Survey, 2008

[61] The cost of raw material is subtracted from the gross value of output in order to arrive at value added.

1.5 Access to Finance Regime in the Leather and Leathergoods industry

1.5.1 SMEF Sample Survey results about access to finance

Before we could present an analysis of the access to finance on the part of SMEs, we need a framework of discussion as to what we shall mean by access to finance regime? The regime typically involves the following narrative variables, namely, (1) size structure of loans; (2) structure of interest rates.[62] . We recognize two categories of loan---namely, institutional, non-institutional and trade credit.[63] The issue remains that the coverage of the data relating to institutional and non-institutional loans is better compared with trade credit. That is why we also present weighted average using two alternative bases. One of these bases only takes into account institutional and non-institutional loans. Trade credit is missing from the other. We present information concerning loan sizes with respect to three borrower situations, namely, institutional loans; non-institutional loans and trade-credit.

1.5.1.1. Structure of loan sizes

Table 1.26 presents results concerning several indicator variables cited above, namely, the proportion of establishments with access to institutional loans, average loan size and average interest rates. For each category of loans types, we also present information about interest rate structures.

Table 1.26: Structure of institutional loans taken by establishments in Leather and leathergoods industry, 2006/07 (Tk. 000s)

Farm status	No. of bank loan taker	% of cases with bank loan	Average loan size of firms that received bank loans	Average loan size taking all firms	No. of leasing company loans	% of interest for bank loan
Micro	2	12.5	231.25	28.90	0	15
Small	33	45.20	9550.87	4317.51	2	14.47
Medium	12	40	34216.67	13686.67	1	15.11
Large	8	40	130424.8	52169.92	0	12.08
Mismall	35	39.3	7875.43	3097.07	2	14.50
Melarge	20	40	72699.94	29079.98	1	13.84
All	55	39.5	31193.60	12342.79	3	14.24

Source: SMEF Survey, 2008

[62] One could also argue that (1) structure of outstanding loans with respect to the value of fixed collaterals; (2) the age-structure of arrearages ought also to be included in the definition of finance regime. We agree completely. We made an effort to also collect data on outstanding loan values and their age structure. It is in the area of access to finance that the degree of cooperation of our respondents with the survey was the most lackadaisical, if not outright adversarial. In a very large proportion of cases, the respondents simply refused to discuss the issue of 'outstanding loans' and 'age ’

[63] Trade credit is also recognized in our data. For three of our sectors, respondents cooperated more than in others as far as interest rates on trade credits. For the sectors where the data were the most inclusive, trade credit averaged roughly at 33.3% annually. It is this average that we have used for the other three sectors where data was not available.

1.5.1.2 Loan sizes' structure of bank loans

Among the establishments of the leather and leathergoods industry of Bangladesh, the proportion that has a loan from at least one scheduled bank or leasing company is 39.5%---in all, there have been 55 cases of a firm taking a bank loan. The average bank loan size in this industry is Tk. 31.2 million. The average maturity of the loans in this sector is 3 years. Those are the averages. However, there is a very significant dispersion of both loan sizes and interest rates around these average with regard to firm size variable. The table clearly shows that as compared with MiSmall establishments, medium and large establishments (represented by MeLarge establishments) have significantly larger bank loan contracts---Tk. 72.7 million *versus* Tk. 7.9 million[64]. That difference is statistically highly significant: after all, the average provisioning of bank loan for the MeLarge is about 9 times that for MiSmall establishments. More important, average bank lending to MeLarge establishments *versus* MiSmall establishments is found to be larger by a factor of 9.39 when we take the entire sample into account. Significantly enough, as compared with MiSmall establishments who are dwarfed in terms of the loan size, the rates of interests paid by MeLarge establishments are statistically slightly lower than the MiSmall class. The evidence is therefore clear that MiSmall establishments are under-banked compared with MeLarge establishments.[65]

The prominence of credit on the books of account of SMEs is important not for academic reason. It is for an entirely practical reason. And the reason is that the amount of credit is a major determinant of the per-worker output in the industry, even after controlling for several relevant variables. It is therefore important to profile both the MiSmall and MeLarge establishments in terms of the affordability of their access to credit relative to "requirements" they have. Entrepreneurs in the MiSmall category are clearly credit-constrained. Whereas their working capita needs in the study year happen to be on average Tk. 6.5 million, their availment of institutional debt finance happens only to be the size of Tk. 3.5 million. That is to say, they have to depend upon trade credit or informal credit availment to the extent of Tk. 3.5 million.

The trouble is that among the establishments of the leather and leathergoods industry of Bangladesh, the proportion that has a loan from at least one non-institutional loan is only 27.33%--in all, there have been 38 cases of a firm taking a non-institutional loan. The average loan size of a non-institutional loan contract is Tk. 223.18 thousand. The leather and leathergoods industry does not have much 'access' to non-institutional credit.

[64] These averages are only calculated based on cases where a loan contract was issued to the sample observation.

[65] We have put this conclusion a little euphemistically. It is quite correct to say that the degree and the provisioning of institutional credit by medium or large establishments would be understated to a greater degree compared with MiSmall establishments. For a larger proportion of the cases, the MeLarge establishments were characterized by non-response to questions concerning the fact and the extent of bank loans or loans from leasing companies.

Table 1.27: Structure of non-institutional loans by establishments in Leather and leathergoods industry, 2006/07 (Tk. 000s)

Firm size	No. of non-Institutional loans taken	% of cases with loans	Average loan size of firms that received loans	Average loan size taking all firms	% of interest for bank loan
Micro	3	18.75	125	23.43	0
Small	25	34.72	324.30	111.06	2.36
Medium	6	20	121.66	24.33	3.8
Large	4	20	90	18	1.25
Mi small	28	31.81	288.06	90.62	2.10
Melarge	10	20	109	21.8	2.8
All	38	27.33	223.18	61.01	2.45

Source: SMEF Survey, 2008

Among the establishments of the leather and leathergoods industry of Bangladesh, the proportion that has exposure to trade credit is 27.39%---in all, there have been 33 cases of a firm availing of trade credit. The average loan size of a trade credit deal is about Tk. 1902. That said, the size of trade credit per establishment is Tk. 451.58 thousand. The leather and leathergoods industry has a good deal of exposure to trade credit.

Table 1.28: Structure of trade credit availed by establishments in Leather and leathergoods industry, 2006/07

Firm size	No. of trade credit taker	% of cases with trade credit	Average loan size of firms that received loans	Average loan size taking all firms
Micro	0	27.39	0	0
Small	20	33.33	1460.60	400.1
Medium	10	15	2601.46	867.1
Large	3	22.47	3986.44	597.9
MiSmall	20	26	1198.02	269.2
MeLarge	13	23.74	3155.45	820.4
All	33	27.39	1902.13	451.5

Source: SMEF Survey, 2008

Note: Interest rates payable on trade credit in the leather and leathergoods industry is about 33% on annualized basis.

Table 1.29: Weighted average Interest rates

	weighted average of interest rate (%)	
	Institutional and non institutional	Institutional, non institutional and trade credit
micro	10	10
small	14	17
medium	15	16
large	12	13
mismall	14	17
melarge	14	15
all	14	15

Source: SMEF Survey, 2008

1.5.2 Needs and requirements for finance in the study industry of Bangladesh

Capital earns a return because rational economics agents have a positive time preference: consumption today is preferred to consumption tomorrow. Capital intrinsically involves the sacrifice of consumption, for which the contributor of capital will demand a reward. In business, capital in use comes in two forms---fixed capital and working capital. The two intrinsically differ in the treatment of time each is imbued with. While working capital is about the capital that typically has a life of one year, fixed capital will involve sacrifice of consumption over many years. Both forms of capital are valuable, and that is why both are needed by enterprises.

Financial requirements of firms are of two major categories. The first is about the need for long-term finance, typically required by enterprises as they go about setting up investment projects with life-times exceeding many years. Typically, this is called 'the need for term loan'. And then there is the need for short-term loan, defined to extend to maturities of up to a year. Medium-term loans are defined to extent to maturities of between 12 months and 36 months

Because the rates of interest in Bangladesh are among the highest in Asia, and the competitive threat from global competition, including from Asia's two humongously large economies of China and India among the greatest, the demand for long-term loans for manufacturing in Bangladesh is relatively small. The universe for such loans is populated largely by well-capitalized 'corporate' financing clients whose capacity to service such loans is a transparent to most banks. Commercial banks avidly seek the custom of such tier-one customers, sometimes offering attractive interest rate discounts. Banks do actively take into account the fact that such large corporate customers generate much more business by way of service charges based on their import trade and L/C margin and the like. They stand to gain more in the swings than lose in the roundabouts.

There is also some *a priori* evidence that short-term loans are more quick-disbursing and account for a majority of the credit "requirements" of the SMEs in Bangladesh. Some evidence in support of this can be seen in the work of Chowdhury and Rahman (2008). When the Bangladesh Bank and the IDA capitalized an window for funding the Small Enterprise Fund (SEF) based on a re-finance --- as opposed to pre-financing --- scheme, traders applying for short-term loans accounted for by far the largest percentage of the disbursements out of this fund (Chowdhury and Miah, 2006; Chowdhury and Rahman, 2008). The assertion is also supported by data available from the Bangladesh Bank, relating to the distribution of advances with respect to loan maturities. To quote: "short-terminism seems to be the order of the day (Chowdhury and Miah, 2006)." Working capital requirements thus happen to be a key vantage-point for appraising a financing industry from the perspective of SMEs. It has to suffice for the moment as the basis for the presentation of our results about the extent to which access to finance is the binding constraint for SMEs in Bangladesh.

The following few paragraphs are about how we measured the quantum of fixed and working capital that are needed by enterprises. We start with fixed capital requirements. But first we need to share a few caveats with you.

Capital machinery is bought based on a production plan that extends over many years of life. In the interim, of course, the level of demand for the output of the industry in question will be subject to all manners of fluctuations, ranging between those associated with trend variables, cyclical and seasonal factors, even random fluctuations. The typical situation of a manufacturing establishment in Bangladesh is where it reports that capacity for production --- and this reflects the use of fixed capital in the business --- is less than fully utilized. Capacity utilization the size of 60 or 70% of economic rated capacity, which is accurately characteristic of the particular industry under study in this sector report, is emblematic of a situation of excess supply of fixed capital. In a land that suffers from conditions of scarcity of capital, a spectacle of excess fixed capital is itself suggestive that it is the supply of fixed capital requirements is not the dominant problem.

There is also an intrinsic difficulty that crops up in assessing whether the requirement of fixed capital of a particular class of entrepreneurs is typically unmet. The point is that whether the supply of fixed capital financing is constricting is revealed at the first instance to the entrepreneur that, with a business plan in the attaché case, is seeking to raise start-up capital. The issue is that such an entrepreneur was almost beyond the pale for this, or for that matter for any survey such as this, simply because of the methodological requirement for a sample frame of *existing* enterprises. There is no accessible list frame of entrepreneurs having credible business plans for which capital is sought.

Our answer to this problem has been to solicit information about the relative importance of equity and retained earnings versus debt as sources of finance at start-up of the sample establishments. And we learn that by far the greatest percentage of the sample establishments have had to start up with equity infusions or with retained earnings. Table 1.30 presents the results of this exercise. It shows that in leather and leathergoods industry of Bangladesh, entrepreneurs started up almost entirely with own equity or retained earnings from other businesses or generally from internally generated funds.

Table 1.30: Average equity-debt ratio in Bangladesh's leather and leathergoods industry

Farm status	% of equity	% of debt	Equity-debt ratio
Micro	98.42	1.57	98.4:1.6
Small	87.23	12.76	87.23:12.77
Medium	99.56	0.43	99.56:0.44
Large	94.85	5.14	94.86:5.14
MiSmall	88.09	11.90	88.09:11.91
MeLarge	97.66	2.33	97.66:2.34
All	96.27	3.72	96.27:3.73

Source: SMEF Survey, 2008

The one compelling finding that arises from this table is about the role of a conspicuous minority to which debt in general has been assigned in this table. Overall, only about 3% of the start-up capital raised in the leather and leathergoods industry of Bangladesh has been in the way of debt.[66] Suffice it for the moment to say that the long-term, start-up, capital is in critically short supply.[67]

The rest of this discussion will seek to concentrate on working capital capita finance in assessing the gaps in the performance of the markets for capital.

1.5.2.1 Assessing the state of the provisioning of working capital finance

In an article published in 1964, Professor Amartya Sen, now of Harvard University, formulated how one can get at the working capital needs of businesses. Working capital, he argued, comprises largely of five sub-components. They are (i) value of input inventories; (ii) value of work-in-progress; (iii) value of output inventories; (iv) average value of the receivables[68]; and (v) the amount of cash on hand, which generates the equivalent of 'convenience yield' of having the cash resources to prevent any situation that is akin to 'stock-outs' or 'cash-outs'. Being out of cash resources will be tantamount to doing without, and will thus be a potentially costly situation.

Needs for working capital finance closely correspond to the concept of capacity utilization. Accurate assessment of needs for any resources can only be gleaned from a prior assessment of the 'true economic' capacity, not from the 'rated engineering capacity'. Without minimizing the importance of the engineering rated capacity to industrial or production engineers, the fact remains that such engineering capacities need not closely correspond to what is, for cash-gain-maximizing firms, economically rational to produce.

Respondents were asked about how much money was stuck or caught up in the form of working capital in their businesses. 6.31 presents the average working capital provisioning per firm in the leather and leathergoods sample. Before going any further, we need to pause and provide a narrative of what the various column labels in the table really mean. The second column is about value of raw materials inventories. The third column is about the average value of inventories of finished goods. Fourth column is about average value of cash in hand and at the bank. Fifth column is about net receivables in the market---the 'net' being a reference that the difference between gross receivables and payables has shown up here. Sixth column is about the average

[66] The only other recent study to have offered any comparable insight to the one under discussion here is from the World Bank Group's Investment Climate Survey 2002. That sample was skewed towards large establishments, whereas our own sample is 'self-weighted'. Unfortunately, given the fairly highly aggregative way in which that data has been presented, it is not really practicable to get a handle on industry-specific results. It is not unusual therefore that the ICS-2002 reported a much higher prominence to debt as a source of finance. The estimate supported by the survey carried out by this team is much more representative of the broad swathe of establishments actually existing in Bangladesh.

[67] Alternatively, whether we ought to say that the demand for debt as a source of finance has been woefully small is moot too. After it takes two to tango, and in an analysis of one of the markets, such as here, there is demand as well supply to account for. Bangladesh's long-term interest rates have for long been high, especially the privatization of the banks. Over the life times of our sample observations, the interest rates for the term-lending loans have consistently been high. It is therefore no wonder that the proportionate prominence of debt as a source of finance is what it is, ie very very low.

[68] Receivables will no doubt correspond to different 'time-profiles'. There is instinctively a need for an 'averaging' in a situation like this. We derive this value while dividing the reported value of receivables by two: the average value of the receivable would naturally be an average of the 'longest' due and the 'youngest' due.

value of work-in-progress.[69] The last column is about total working capital provisioning.

Several findings from the table rate a mention. Firstly, MiSmall and MeLarge firms split working capital provisioning on a 13.6:450.5 ratio. Secondly,

Table 1.31: Working capital provisioning per establishment (Taka 000s)

Firm size class	Raw material inventories	Finished-goods inventories	Transaction demand for cash resources(cash in hand)	Net Receivables in the market	Value of work in progress	Total working capital
Micro	3010.09	1.84	20	324.28	39.66	1267.64
Small	129162.8	8.82	157.76	784.68	1982.74	16306.72
Medium	380076.7	20.76	1992.5	47704.67	18973.75	396359.8
Large	852028.3	159.86	286.66	268941	11711.22	531917.4
MiSmall	507021.69	27.97	596.76	1316.46	3206.19	13572.34
MeLarge	566890.9	77.66	1261.42	146031.9	16459.8	450582.9
All firms	1233654.67	194.89	2430.88	324588.20	27390.67	171909.5

Source: SMEF Survey, 2008

We estimate working capital requirement based on firms' attainment of its capacity. Our questionnaire had solicited information about the percentage capacity utilization achieved. Before proceeding any further, it is worth asking if it at all makes sense that we might try to envisage a capacity for each of the products.

We are going to argue that it makes perfect sense. Where firms are mono-product firms, evaluation of capacity is typically a straight-forward matter: one merely divides the rated *economic* capacity of the firm, evaluated in terms of the one product that it manufactures by the output, again measured similarly, and multiplied by a hundred.[70] Where, as is presently the case, multi-product firms predominate numerically, it is necessary to help respondents define the very concept of capacity so as to accommodate the plurality of the cash-gain-maximizing output-mix of firms. This has been done presently.

Our data enabled us to calculate the proportions of revenue generated by each of the sample observation's main products. We use these percentage (or relative shares) as

[69] The quantity of working capital that remains invested in the form of 'work-in-progress' depends upon the chronological lag between 'input' and 'the emergence of output', typically measured in the number of days.

[70] Note that we are using the concept of economic capacity, and not *rated engineering* capacity. Engineering capacities in the nature of things overstate economic capacities, because they fail to factor in *economic* or *business* or *regulatory* constraints which are *force mejeure* for the firms. The firms can't relax or mitigate these constraints. Economic constraints thus always lie below engineering constraints. In the approach we made in our own measurement of capacities at the level of individual products, we were diligent in steering the conversation with the entrepreneur such that the benchmark captured for purposes of the calculation of capacity utilization was economic capacity. A second issue was about how we dealt with the issue of plant, machinery, and equipment being fungible, ie capable of being used in tandem in the production of more than just one output. This was a real problem in that many, indeed a clear majority, among our sample observations are multi-product firms. It would be quite natural for the output-mix that would maximize profitability to be treated as among the factors that determine the *economic capacities* for each of the products under study. Our survey staff tried their utmost to convey these vibes to the respondents before asking the question about product-specific capacities utilized.

weights in migrating from product-specific capacity utilization estimates into an weighted average capacity utilization estimate. This is presented in Table-37. It is these findings that we need to discuss more fully.

We find that the weighted average capacity utilization rises in a tidy monotonic fashion across the four size classes. At 50.5%, the weighted capacity utilization of the micro segment is the lowest. The small establishments do considerably better, at 65.8%. Medium and large establishments score 72.7% and 76.3%. MeLarge establishments out-achieve MiSmall establishments by a clear 10.1 percentage point advantage.

We'd argue that the achievement shortfall in terms of capacity utilization is itself a measure of the extent of the deficit in the scale of the provisioning of working capital that sample firms have suffered from. On the whole, we would say that the leather and leathergoods industry is characterized by a shortfall in its working capital provisioning of some 32%. However, MiSmall establishments characterized by a shortfall in its working capital provisioning of some 36%, whereas the MeLarge establishments are characterized by a shortfall in its working capital provisioning of some 26%.

Table 1.32: Relative Weight of Various major products in the leather and leathergoods industry of Bangladesh

Firm size classes	% of Revenue from different products						
	N	Shoe	Bag	Finished	Crushed	Wet blue	Others
Marginal	16	0	0	51.807	20.625	27.566	0
Small	73	5.82	5.10	65.082	13.233	1.641	9.11
MiSmall	89	5.70	5.00	64.815	13.381	2.161	8.927
Medium	30	30.05	0.525	30.796	27.201	0	11.41
Large	20	64.32	3.032	20.809	8.6219	0.498	2.711
MeLarge	50	55.74	2.404	23.308	13.272	0.373	4.891
All	139	48.94	2.757	28.948	13.287	0.616	5.439

Source: SMEF Survey, 2008

Table 1.33: Weighted average capacity utilization in the leather and leathergoods industry of Bangladesh

Firm size class	% of utilization of capacity						Weighted average capacity utilization
	Of Product			Average revenue from			
	One	Two	Three	One	Two	Three	
Micro	50.5			100	0	0	50.5
Small	65.72	69.37	60	94.70	4.937	0.359	65.8
Medium	73.10	69.44	72.5	88.86	10.03	1.104	72.7
Large	76.5	75.83	70	90.23	7.556	2.203	76.3
MiSmall	63.72	69.37	60	94.80	4.839	0.352	63.9
MeLarge	74.48	72	72.5	89.89	8.170	1.931	74.0
All firms	67.94	71.08	68.33	90.56	7.718	1.716	68.1

Source: SMEF Survey, 2008

1.6 Comprehensive understanding of the marketing chain

Marketing is the business of connecting consumers with manufacturers. This involves transporting a commodity between places, storing it between periods and changing its form to make it fit for human consumption. In all economies, this is a vital function to perform efficiently, ie. At least possible resource costs. Economies, and markets, differ in terms of how well the marketing function is performed. Marketing is efficiently performed when the marketing agents charge keen rates for the use of their resources---time, money, skills, vehicles or fixtures, assets, godowns and risk-bearing---and earn competitive profites. The consumer pays a price that is deemed closely related to the resource costs of supplying to him the commodity in the quantity and at the place and time desired. The manufacturer receives a price that keenly compensates him for the use of the resources up to that stage of production. Understanding how competitively a market performs involves looking at the costs of and normal returns to marketing. On the cost side, we look at the cost of production, and at the cost of spatial arbitrage and at the cost of marketing. Finally, we present the combined wholesale and retail margins found from the traders' survey.

1.6.1 Cost of production

Table 1.34 below reports on total cost of production as well as average costs of the establishments in the leather and leathergoods industry of Bangladesh.

Table 1.34: Average cost of production of final produce in leather and leathergoods industry of Bangladesh (Taka per unit)

	Cost of production per establishment (Tk. 000s)	Physical output, in homogeneous units (000s)	Cost of production per unit of output (Tk).
Micro	4545.67	14536.01	577.32
Small	45055.38	105977.2	621.64
Medium	154888.3	419815.4	736.81
Large	564532.6	960391.5	695.57
MiSmall	37772.73	93945.48	615.82
MeLarge	318746	636045.8	720.32
All firms	138842.3	309064.7	657.28

Source: SMEF Survey, 2008

Before proceeding any further, we have to note that these average costs of production cover a relatively large collection of products. These averages in the table are weighted averages, arrived at by dividing average outlay per establishment across size classes by the corresponding average physical volume of production. . Cost of production of micro establishments in the sample is Tk. 577.32, as opposed to Tk. 621.64 for small establishments. Likewise, the cost of production of medium establishments is Tk. 736.81, as opposed to Tk. 695.57 for large establishments.

We find a difference among the four size-classes of firms in terms of the unit production cost that is statistically very significant. Indeed, with the exception of large firms in the sample, unit price on average monotonically goes up as one goes across the size class of establishments. This is largely because leather accounts for the largest combined percentage of the total cost of production (see below in Table 1.42), and because not all classes of establishments can buy equally advantageously in both set of markets. Differences among various size-classes in terms of the monthly wage rates too are also all that different.

Naturally enough, retail prices differ very significantly among various size classes. Medium and large (MeLarge) firms typically outprice micro and small (MiSmall) establishments. And this is consistently true whether one is looking at the shoes or bags, or crust leather. Clearly, the MeLarge establishments are selling things at a relative premium, compared to MiSmall establishments.

In theory, the marketing margin for MeLarge players could be larger compared with MiSmall players because of yet another reason. The former makes an effort to produce goods representing on average a product for buyers with a deeper pocket and larger buying power. The clear evidence for this can be had from examining the unit prices of the goods they sell. The average prices of their goods is clearly statistically significant and higher compared with MiSmall players' average prices.

The following table reports on the marketing margin among the establishments on our sample. Marketing margin for the establishments as a whole is defined as follows:

$$\mathrm{Mi} = \frac{(\mathrm{Pr} - Pm)}{Pm} * 100$$

Where M happens to be the sector-specific market margin, Pr is the average price at the retail level, Pm is the *ex-factory* price.

We find that marketing margin in the leather and leathergoods sector is 20.7%. It was not possible to determine the marketing margins for micro, small, medium and large firms separately. This was largely because the traders were not able to tell products from say small firms apart from medium or large firms.

Table 1.35: Average retail prices of five major categories of final produce in leather and leathergoods industry of Bangladesh (Taka per unit)

Firm size class					
	Shoe	Bag	Finished	Crushed	Wet blue
Micro	0	0	96.1826	88	105
Small	443.5882	2973.33	138.0933	117.71	108.33
Medium	707.059	1030	137.5667	141.167	
Large	1215.2727	2040	165.0552	139.75	58
MiSmall	443.5882	2973.33	130.8673	112.7583	107.5
MeLarge	906.7143	1366.67	151.3159	140	58
All firms	731.7556	2170	136.8523	120.9471	97.6

Source: SMEF Survey, 2008

1.6.2 Decomposing the relative importance of exports *versus* domestic marketing

The following table presents an information concerning the comparative reliance of the sample establishments upon domestic sales versus exports.

Table 1.36: Comparative prominence of export-oriented versus domestically-marketed goods in the leather and leathergoods industry (Per cent)

Firm size class	% of revenue derived from		
	Sales domestically	Exports	Total
Micro	15.38	84.61	100
Small	50.22	49.77	100
Medium	54.48	45.51	100
Large	90	10	100
MiSmall	44.56	55.43	100
MeLarge	68.97	31.02	100
All firms	53.83	46.16	100

Source: SMEF Survey, 2008

Overall, 46.16 percent of the revenue in this industry are generated from exporting, and the residual of 53.83% are generated from domestic sales. That said, the survey found a statistically significant difference between MiSmall and MeLarge establishments in terms of the exposure to the export markets---55.43% *versus* 31.02%.

Table 1.37: Number of principal customers, and relative prominence of various exporting channels in the leather and leathergoods industry (Unless stated to the contrary, per cent)

Firm size class	No. of principal customers	Of exports			Average unit price of exports ($ US)
		% exported directly, by oneself	% exported through others	% exported unofficially	
Micro	4	50	50	0	1.58
Small	4.57	43.5	52.2	4.3	10.08
Medium	5.18	63	37	0	12.76
Large	6.67	53.8	46.2	0	10.95
MiSmall	4.44	44	52	4	9.06
MeLarge	5.5	60	40	0	12.17
All firms	5.08	53.8	44.6	1.5	10.78

Source: SMEF Survey, 2008

The table shows that average number of principal customers per establishment on this sample is 5.08. In terms of the number of principal customers the MeLarge establishments have a slight lead over their MiSmall counterparts. As well, own-account exports and exporting through one's agents split on a 54:46 basis.

Table 1.38: Market channels for domestic sales in the leather and leathergoods industry (Per cent)

Firm size class	% sold domestically through wholesalers	% sold domestically through own outlets	% sold domestically through agents	% sold domestically through others
Micro	22.2	0.0	11.1	66.7
Small	67.4	0.9	11.1	20.6
Medium	60.7	6.4	20.0	12.9
Large	50.0	0.0	25.0	25.0
MiSmall	58.2	0.7	11.1	30.0
MeLarge	58.3	5.0	21.1	15.2
All firms	58.2	1.9	14.0	25.8

Source: SMEF Survey, 2008

1.6.3 Reliance on own sales outlets *versus* distributors *versus* commissioned sales agents

The narrative now turns to the different degrees of marketing strategies of the sample observations based on comparing their reliance on each or all of the three alternative options cited

MiSmall and MeLarge firms evince almost the same percentage reliance upon sales through wholesalers---of about 58% (Table 1.38). That said, micro firms are set quite apart from the rest of the pack when it comes to relying on wholesalers---they sell only 22% of their stuff through wholesalers. The second most preferable marketing channel of choice happens to be the 'others' category. Selling through commissioned agents is at a third position.

Table 1.39 is about various aspects of the business relationships with wholesalers on the sample. The second column of this table is about average number of wholesalers through which the sample firms transact their businesses. The next column is about the percentage of the sales on average which tends to be sales on credit. The next column is about the length of the period for which the credit is advanced. The next column is about the excess in price over and above 'cash sales' that is charged in the case of 'credit sales'. The last but one column is about the percentage of credit advanced that remains unpaid at the years' end. Finally, the last column shows what on average remained outstanding receivable at the years' end, it being noted that these averages only correspond to those firms that decide to extend loans to their wholesalers.

Table 1.39: Wholesaling market channels in the leather and leathergoods industry (Per cent)

Firm status	Average number of wholesalers per firm	% sold credit	Period of credit	% more for credit	% unpaid	Recent Unpaid
Micro	4.5	55.0	180.0	3.50	20.0	3250
Small	6.2	51.8	351.1	4.94	11.1	7694
Medium	7.4	61.3	365.0	5.88	15.4	17750
Large	5.5	35.0	365.0	5.00	15.0	160000

Firm status	Average number of wholesalers per firm	% sold credit	Period of credit	% more for credit	% unpaid	Recent Unpaid
Mi small	6.1	52.1	334.0	4.80	12.0	7250
Melarge	7.1	56.0	365.0	5.70	15.3	46200
All	6.4	53.4	344.3	5.10	13.1	20233

Source: SMEF Survey, 2008

Table 1.39 shows that the average firm relies on 6.4 wholesalers. Fifty three percent of sales through wholesalers are facilitated with trade credits being extended to wholesalers. These trade credits are typically for a year, the firms say.

Table 1.40: Direct sales outlets channels in the leather and leathergoods industry (Per cent)

Firm status	Average sales Outlets per firms	Average no. of stuff who man outlets	Adminstrative cost per firm on these outlets	Average monthly Wages (Tk.)	% Rejected
Micro	0	0	0	0	0
Small	2	10	40000	5000	1
Medium	1.6	8.6	36666.67	5000	1.67
Large	0	0	0	0	0
Mi small	2	10	40000	5000	1
Melarge	1.6	8.6	36666.67	5000	1.67
All	1.75	9	37500	5000	1.5

Source: SMEF Survey, 2008

Table 1.40 shows several things. Firstly, overall firms in the leather and leathergoods industry man 1.75 own-account sales outlets . MiSmall establishments out-retain MeLarge establishments by .33---2 outlets *versus* 1.67. Secondly, the average size of a direct sales outlet maintained by the MeLarge establishments in terms of the number of workers per sales outlet is slightly larger than the MiSmall establishments (10 *versus* 8.2 workers hired per sales outlet).

Tables 6.41 is about the economics of the commissioned agents and about the terms under which manufacturers' transactions with them take place.

Table 1.41: Commissioned agents' channels in the leather and leathergoods industry (Per cent)

Farm status	Total Agent	Per head Com.	Total Com.	% rejected
Micro	0	0	0	0
Small	4.7	36.1905	1692.2	.5
Medium	6	42.5	19839.7	2.3750
Large	9.6	33.33	21240	1
Mi small	4.7	36.1905	1692.2	.5
Melarge	7	40	20221.6	2
All	5.4	37.5	8720.6	1.0323

Source: SMEF Survey, 2008

1.7 The drivers of unit costs of production

Unit costs are defined as the total cost of production divided by the rate of the establishment's output. The following budget line items have been added up while getting at total cost of production:

Cost of raw materials;
Cost of other materials (such as fuel, lubricants, dyes and chemicals, packing materials)
Spares parts, and cost of preparing moulds etc.
Repair and maintenance, etc
Financing costs
Office supplies
Communication, storage, and transportations
Wages and salaries
All kinds of utility expenses
Advertizement expenses
Marketing outlay
Rentals of various kinds
Commercial expenses arising in connection with foreign trade
Miscellaneous expenses

Table 1.42 breaks down total costs of production using a 4-part scheme for division, namely, raw material costs, parts and components costs, wages and salaries, and other expenses. (Subsequently, in Table 47, we presents the costs using a finer breakdown.) In the last column, the table also then reports on average cost of production. The average cost of production is clearly a monotonically rising function across the four size classes of the establishments in this industry.

Table 1.42: Cost of production per establishment in the leather and leathergoods industry (Tk.000s)

Firm size class	Raw materials costs	Parts & components, repair & maintenance	Wages	Other expenses	Total cost of production	Overall cost of production per unit of output (Tk)
Micro	3765.64	62.82	307.81	376.65	4545.67	577.3
Small	40635.44	249.39	1136.26	2562.52	45055.38	621.6
Medium	142001.7	1208	4565	7113.6	154888.3	736.8
Large	489332	5014.4	44039.55	26146.68	564532.6	695.5
MiSmall	34007.16	215.85	987.33	2169.55	37772.73	615.8
MeLarg	280933.8	2730.56	20354.82	14726.83	318746	720.3
All firms	122829.7	1120.42	7954.05	6686.56	138842.3	657.2

Source: SMEF Survey, 2008

Table 1.43: Cost of production per establishment in the designer goods industry by narrower categories (Tk.000s)

Firm size class	Raw materials costs	maintainance cost	wage cost	utility	add and marketing	lease and rental cost	Comercial cost	Interest Price	Total outlay
Micro	3766	63	308	118	0	156	25	65	4500
Small	40635	249	1136	772	380	509	769	226	44677
Medium	142002	1208	4565	1399	1363	1512	2218	718	154985
Large	489332	5014	44040	7041	950	2644	2182	12218	563421
MiSmall	34007	216	987	655	279	445	635	197	37421
MeLarge	280934	2731	20355	3656	1225	1965	2204	5318	318387
All firms	122830	1120	7954	1734	478	992	1200	2052	138359

Source: SMEF Survey, 2008

Table 1.44 is about the percentage structure of costs of production in the leather and leathergoods sector of Bangladesh.

Table 1.44: The structure of costs in Bangladesh's designer goods industry, 2006/2007

Firm size class	Material cost	maintainance cost	wage cost	utility	add and marketing	lease and rental cost	Comercial cost	Interest Price	Total
Micro	83.7	1.4	6.8	2.6	0.0	3.5	0.6	1.5	100.0
Small	91.0	0.6	2.5	1.7	0.9	1.1	1.7	0.5	100.0
Medium	91.6	0.8	2.9	0.9	0.9	1.0	1.4	0.5	100.0
Large	86.9	0.9	7.8	1.2	0.2	0.5	0.4	2.2	100.0
MiSmall	90.9	0.6	2.6	1.7	0.7	1.2	1.7	0.5	100.0
MeLarg	88.2	0.9	6.4	1.1	0.4	0.6	0.7	1.7	100.0
All firms	88.8	0.8	5.7	1.3	0.3	0.7	0.9	1.5	100.0

Source: SMEF Survey, 2008

1.7.1 Fitting Cost Functions in the Leather and leathergoods industry of Bangladesh

Policy-making for pro-poor growth will often put a premium on being able to understand the drivers of unit costs. The point here to note is that cost competitiveness is good for competitive performance. And that being able to lower one's average costs is good for one's survival in the long run. As well, unit costs are the metric that everyone, especially including the competitors in the emerging industrial powerhouses in the Asia region, watches intently. Especially in China and India, the world's largest manufacturing juggernauts are amassing latest technologies, skills and computer-aided manufacturing gadgetries, helping such countries become ready receptors of the massive surge in demand for their products which are now in the process of being unleashed. Therefore, aggressive monitoring and mentoring of costs is imperative if firms have any ambition at all for survival, and growth, in a feverishly competitive 'global village' that the world of commerce and industry have managed to become in the last four decades.

Competitive cost analysis is important for a number of reasons. While financial accountants concern themselves mainly with elements of costs --- and this concern is also importantly shared by the management --- it is however the cost drivers that are of far greater operational significance. The literature suggests that cost drivers essentially fall into four categories, and they are (i) design-related costs; (ii) facility-related costs; (iii) geography-related costs; and finally (iv) operation-related costs. Before proceeding any further, it is moot to enter just a few sentences each with respect to each of these four categories of cost drivers.

Design-related cost drivers: Because a product owes itself to a design process, it is imperative to get the design-related costs of alternative specifications right. This is necessary so that an apples-to-apples comparison is possible among alternative product designs that offer comparable functionalities. It is important in doing to start off from an well-agreed definition of what is the goal of the design process. We mean to say that the same set of functionalities can be achieved with or without offering *additional desirable capabilities*. Such design-stage add-ons will always come on with cost additionally.

Facility-related cost drivers: Some production technologies are such that it is advantageous to scale their output up, because larger scales of output ensue economies of scale, which smaller scales of output don't. This consideration makes it imperative to treat the scale of output, or the technologically-determined size of the plant a facility-related cost driver that we need to model the effect of. As well, at times, the economies of scale are not so much technologically datum as the derivative of some economic incentives, for instance the fact that volume discounts may be available on input purchases, and that large scales of output are associated with large volumes of input purchases. That is, there are economies of procurement and marketing. If used or rented equipment are cost-effective relative to new equipment, the recycling of used or rented equipment is a desirable cost driver. If frequent power outages render investment on large capacity electricity generators cost-effective, the shrewdness in the process of locating the least-cost generation technology is likely a positive cost driver.

Geography-related cost drivers: Spatial pockets of relatively high wages, or high input prices exist in every country. Rental rates are relatively high in certain clusters than in others. The down-payments that need to be made in the swankiest parts of the city in order to lease 'showroom' or 'display centers' tend to be much higher than in boorish parts of town. The point is that geography can be destiny in certain kinds of businesses. And yet geography can be an important competitive cost motivator.
Operation-related cost drivers: It is increasingly recognized that manufacturing operations can be more or less mean. Japanese manufacturing has famously introduced lean manufacturing, or the just-in-time (JIT) manufacturing. The extent of specialized training of the Managing Director will be an operational cost driver, as will whether the establishment is located on or near the all-weather highway. As well, the ratio of the number of production workers to the number of mid-level supervisory and managerial workers will also shape up as yet another operational cost driver. Moreover, percentage reliance of the establishment on imported raw materials (to be evaluated using the ratio of imported parts and components in the total outlay on raw materials) will be utilized as yet another operational cost driver.

The really important question is what are the drivers of the unit cost of production. To answer that question, we shall need to consider a number of competitive cost drivers.
The most basic form of the cost function is the one in which the unit cost is simply modeled as a function of the rate of output. At times, in order to test for any non-

linearity in the cost surface, a quadratic terms is also typically factored in. Sometimes, even a cubic term is also introduced into such a cost equation. Under these circumstances, the cost function has the following appearance:

$$\text{Ln©} = c_0 + c_1{*}\ln(Q) + c_2{*}\ln^2 Q + c_3 \ln^3 Q + c_i \Sigma X_i$$

Where C = Average cost of production

Q = The rate of output

Q^2 = The rate of output squared

Q^3 = The cube of the rate of output

c_0, c_1, c_2 and c_3 are coefficients of the cost function to be estimated;

'ln' is the code of natural log;

and X is a matrix of a number of explanatory, shifter, variables.

X includes two locational dummy variables corresponding to Dhaka and Chittagong, three firm-size dummies (micro (F_D_1), small (F_D_2) and medium (F_D_3)), and elements of two price vectors, namely, average material input prices, and wage rates.

Table 1.49 presents the coefficients of the logarithmic cost function that we have estimated. The following findings are highlighted by the numbers. Firstly, we find that the underlying cost surface is like a whip-saw in the log-log space, in this industry. The coefficient of the log-linear segment is positive and highly significant. This means that as scale of output rises early on, unit cost declines significantly, as, for instance, machines are 'run in', workers run up the learning curve. As a result of both factors, raw material wastage tends to decline. The log-square term is negative and highly significant too. Over the relevant range of output, this happens because severe diseconomies of scale and scope set in, thus ratcheting unit costs up. The log-cubic term then is negative once again, with its coefficient highly significant. Dummies for micro, small and medium establishments are each highly significant. Because the large establishments provide the control in the specification of these three dummies, the implication is that relative to large establishments, unit costs of micro, small and medium establishments are, given their quality quotients, significantly lower.

Table 1.45: Determinants of logarithmic cost function in the leather and leathergoods industry

(Regressing natural log of average production cost per unit of output in Taka)

	Regression coefficient	t-stat
(Constant)	10.437	31.901
LnQ	6.815E-06*	9.267
Ln^2Q	-4.232E-12*	-6.769
LN^3Q	7.327E-19*	5.705
CTG_DUM	.374	1.300
DHK_DUM	-.406	-.897
F_D_1	-2.549*	-6.215
F_D_2	-1.429*	-4.854
F_D_3	-.934*	-3.194
R^2		.745

Note: Single asterisk attached to a T-statistic implies that the corresponding regression coefficient is significant at 5% error probability level, and two asterisks imply significance at 10% error probability level.

Source: SMEF Survey, 2008

Knowing that the rate of output drives unit cost, while it is certainly of some pedagogical interest, is not of much policy importance. This is so because the output is itself a composite, and the subject of the combined influence of several factors of production. It does not single out the role or the importance of any one particular driver that may be of some quantifiable importance to policy makers.

Much has been made in the literature of the fact that capacity utilization be used as a competitive cost driver. This does not however accord very well with econometric principles. Capacity utilization is simply a ratio between the rate of output achieved to some well-formed notion of economic capacity. One reason why this is not all that interesting from the perspective of policy formulation. Unit costs are merely functionally dependent upon a transformation of output. The latter is bound to closely correspond to the output itself. But what influences average costs by driving output itself is not brought clearly out. Therefore, this formulation is not interesting for the same reason that the first functional formulation is not interesting.

1.7.2 Fitting a flexible translog cost function to the data

A translog cost surface is often advanced as an appropriate analytical tool to capture the drivers of costs in any industry. Annex-2 presents the analytical model that most researchers apply to the problem. The glossary of the variables used is also presented in Annex 2. All unit data are transformed logarithmically. LnY refers to natural log of the output level; lnP1 refers to natural log of input prices; lnP2 refers to natural log of the wage rate; lnP3 refers to natural log of the interest rate; lnK refers to the natural log of fixed capital on replacement cost basis; $\ln^2 Y$ refers to the square of the natural log of Y. All the remaining terms are interaction terms based on the foregoing variables. The results are now discussed.
First, compared with the cubic cost function, r^2 has risen to 0.87: clearly, the functional form reported in Table 1.46 is a more accurate description of the cost surface of the sector. Following findings are important. First, if the scale of output increases, total variable cost (TVC) increases, too. Variables costs are increasing in material input prices, and the effect is statistically significant. This result is quite intuitive.

Table 1.46: Determinants of trans-log variable cost function in the designer goods industry

Dependent variable is Total variable cost (TVC)		
	coefficient	**t**
(Constant)	.681	.188
lnY (Y=output)	.886**	1.824
lnP1 (P1=input price)	.612*	2.207
lnP2 (P2=wage rate)	-.442	-.679
lnP3 (P3=interest rate)	-1.436*	-2.897
lnK (K=capital)	.0356	.200
.5*ln²Y	-.0079	-.203
lnP1*lnP2	.0091	.113
lnP1*lnP3	.0828	1.027
lnP2*P3	.347**	1.933
lnK*lnP1	-.056*	-3.111
lnK*lnP2	.0253	.586
lnK*lnP3	-.0191	-.634
lnP1*lnY	-.0086	-.502

Dependent variable is Total variable cost (TVC)		
	coefficient	t
lnP2*lnY	.0196	.362
lnP3*lnY	.0729**	1.944
F Statistic	46.48	
R Square	0.869	

Source: SMEF Survey, 2008

1.7.3 Actionable plans for lowering average costs

From a number of studies, we now know that unit costs are powerfully influenced by the rate of output, by capacity utilization, by locational advantage, the relative reliance on imports, and the like. Of this, all three are potentially relevant from the perspective of policy feasibility. For instance, the rate of output can be influenced by fostering greater competitiveness in the markets for or greater access to the capital input, or both. Note that interest rates in Bangladesh which are among the highest in Asia (Chowdhury and Miah, 2006; Chowdhury, 2007) can potentially be lowered using measures that bring about greater competitiveness in the credit markets.[71]

It is entirely satisfying that capacity utilization (CU) is inversely related with unit costs. This implies that measures that positively motivate CU will lower unit costs and thus improve competitive performance of establishments.

Units that are located on the main grid of the roads or within some well-recognized clusters tend to have lower average costs compared with units that are located more inland.

And finally, reliance on imports ramps up costs. This is largely because imports are squeezed for all they can sustain. Bangladesh depends on customs duties on imports for more than 40% of her revenues. Imported inputs are therefore more pricey and expensive compared with inputs that are domestically produced.

We include interventions in the Action Plan that we write for the leather goods industry so as to assist the establishments in this industry to lower their costs, and thus improve t heir competitive positions in the industry.

Will drawing up of a tactical plan whereby to mitigate each of the competitive gaps in the performance of sample of enterprises form each of these industrials. While the details of this information will be presented in the Action Plan that we include later in this report, suffice it to say for the moment that the following are the principal props of this action plan:

(1) There has to be a certain degree of facilitation by appropriate authorities in the interest of increasing the capacity utilization of the establishments in the industry. Such authorities may include the National Board of Revenue (NBR), the Ministry of Industries, the SME Foundation, the BSTI. Clearly, the taxation policy of the country

[71] Already, the SME Foundation is on the cusp of initiating credit wholesaling in an potentially effective effort to lower the binding interest rates that especially micro and small establishments have to pay while servicing their loans from the banking system.

will have to carry a lot of the burden of rolling back the average costs for industry. Naturally enough, the NBR, as the locus of the design and the implementation of the Government's taxation policies too will also have to become more accountable in terms of rolling back the costs.

(2) Unit cost is merely the observe of the level of factor productivity achieved or, more precisely, of the total factor factor productivity. Anytime factor productivity increases in an industry, the average cost of production in it falls. This recognition makes it imperative to take a close look at the whatever influences the level of factor productivity. Our own analysis suggests that capacity utilization, the rate of output, the age of the capital machinery, the nature and the length of the training by the entrepreneur, the location of the enterprise, are the factors that influence average costs.

1.8 The ICT Platform of the Leather and leathergoods industry

The world is inexorably being transformed by the Information Revolution. Information technology (IT) has profoundly transformed the *modus operandi* for customer satisfaction in businesses. The delivery of government services and its interactions with the governed have changed like never before. Markets, production, storage, marketing, safe-keeping one's money, keeping track of it, even making it, have morphed due to ICTs in ways never before thought possible. In a famous prediction, a pair of American professors, both having trained in software engineering, wrote that by 2010, about a half of the entire US GDP would comprise of output of industries that either mostly produced information-rich output or consumed it (Shapiro and Varian, 1998). The last 15 years have been famously iconoclastic: one epochal markers after another has been rendered obsolete, in a blur of a phenomenal increase in speed at which and the intelligence with which machines, devices and systems---cogs in the machine that the "information economy" has become---compute, store, retrieve and send across information and data (Chowdhury, 2002). Indeed, everyone's conceivable paradigms in computing, communications and connectivity have been shifted so often in the past few years that many have understandably foresworn counting (Chowdhury, 2003).

The positive net contribution total factor productivity, in developed countries is widely accepted. Investment on IT is found to have spurred the total factor productivity growth (TFP) in the US economy.[72] The estimates range from 0.31% annually by Gordon (2000) to a relatively high 1.19% in a study by the Council of Economic Advisors to the US President's Executive Office (CEA 2001). TFP growth due to IT is far greater within the IT-using industries than in the IT-producing industries. That finding is intuitive, in that IT-using industries (such as financial or healthcare industries) are more information-dense in their business processes, which therefore respond more vigorously to IT investment.that investment in information technology (IT) typically makes to the rate of productivity growth, usually measured in terms of

The ascendant paradigm in communications technologies had its origin roughly in the mid-1990s. A World Bank classic, "Telecommunications is dead, long live computer networking" (Bond, 1997) best presents this paradigmatic shift. Telecommunications, powered by "circuit-switching" technologies, were symbiotic with the old and onerous,

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[72] Economic growth of nations may stem from factor accumulation (of labor or capital) or from growth in total factor productivity (TFP).

the obese and the over-centralized. Computer networking, of which the best-known icon is the World Wide Web (WWW), is by contrast programmable and prodigiously powerful, plebian in pricing, lean and forever learning. The differences in economics between the two are simply staggering, with the Web on the cusp of virtually killing off telecommunication as we have known it. Of particular significance is the centrality of open standards, greater accessibility and therefore the greater proneness to innovation, the shorter time-to-market, etc. that characterize the 'Net-heads' world compared with the 'Bell-heads'.[73] The WWW has profoundly transformed success drivers in business in rich countries. Businesses, governments, charities, and citizens have flocked to the Web to deal and heal, to learn and leverage, to inform and be informed, to educate and to entertain, to make safe-keep and spend one's money and so on. Women outnumber men on the Web. And, like with "brick-and-mortar" buying, clothing is the largest draw of online spending. The "online" buying is becoming pretty much like "offline" buying. In short, the WWW is fast becoming the central character in a cast of thousands. A fluent understanding of the Web and technologies and competencies to leverage it has become an essential ingredient of success drivers---of competitiveness---in the 21st century.

The state and the relevance of the information and communications technology infrastructure that is harnessed by the sample observations is therefore of some interest to us. The following tables (Tables 6.47 and 6.48) present information about these aspects concerning the establishments on our sample. Several findings are worthy of being mentioned. Firstly, the percentage of cases of establishments owning and using personal computers overall is found to be 46.76%, and of server-grade machines 11.51% (Table 1.47). Similarly, some 46.04% of the establishments have an internet connection. Significantly, this proportion of internet access is somewhat higher compared with the proportion of cases of establishments that have at least one mobile telephone: 53.95% of the establishments have at least one mobile phone. The proportion of cases where the establishment was found to have at least one fixed telephone line was about 68.34%, significantly in excess of the corresponding percentage of cases where establishments owned either Internet access or a mobile telephone. This shows that fixed telephone line in this industry still retains an edge when it comes to selecting the mode of people of keeping connected for business or recreation. The reason why this is so is probably because the broadening of the base of the use of the internet is impeded by the lack of Internet bandwidth, for all the rapid rate at which Internet bandwidth provisioning in Bangladesh has grown. Another reason why the penetration of mobile telephony on this sample still lags behind fixed telephony is probably the fact that, for all the bounding growth rate of mobile telephony subscriber base, many areas are not characterized by robust and always-available network connectivity.

Table 1.48 reports on the average number of personal computers, servers, mobile and fixed telephony connections etc. that the sample has returned per user.[74] Several findings are worth emphasizing here. First, establishments that admitted to owning any personal computers admitted owning an average of 2.42 personal computers. Establishments that admitted to owning any personal computers admitted owning an

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[73] "Bell-heads" are named after the Bell Telephone Company, one of the veritable icons of the telecommunications world.

[74] These are averages. These averages are calculated based only on respondents that own any or all of the ICT devices cited in the previous discussion. Cases returning zeroes, while perfectly valid for other computations, have been omitted from the calculations surrounding Table 6.42.

average of 1 server-grade computers. Establishments that admitted to owning an access to the Internet admitted paying for an average of 33.61 Kbps of access to Internet bandwidth. Establishments that admitted to owning any mobile admitted owning an average of 3.84 mobile telephones. Establishments that admitted to owning any fixed telephone admitted owning an average of 1.84 fixed-line telephones. None of the establishments admitted to using any business automation software.

Table 1.47: Profiles of the penetration of information and communications technology into Leather and leathergoods industry, Bangladesh()

Farm status	ICT						
	% of establishments with						
	At least one personal computer	At least one server	At least one Internet connection	Band width	At least one No. of mobile phone	At least one fixed telephone line	No. of Business automation soft.
Micro	0	0	0		37.5	50	0
Small	32.8	4.1	31.5		68.49	58.9	0
Medium	76.6	20	76.6		46.66	83.3	0
Large	90	35	90		25	95	0
Mismall	26.9	3.3	25.8		62.92	57.3	0
Melarge	82	26	82		38	88	0
All	46.7	11.5	46.0		53.95	68.3	0

Source: SMEF Survey, 2008

Table 1.48: Profiles of the penetration of information and communications technology into Leather and leathergoods industry, Bangladesh

Farm status	Average Use of computer, software and Internet					
	No. of personal computers	No. of servers	Bandwidth	No. of mobile phone	No. of T&T	No. of Business automation soft.
Micro	2	0	0	4.67	1.75	0
Small	1.7	0	32	1.73	1.34	0
Medium	2.77	1	33.45	4.95	2.17	0
Large	4.6	1	36	5.8	3	0
Mi small	1.72	0	32	2.08	1.38	0
Melarge	3.14	1	34.56	5.22	2.34	0
All	2.42	1	33.61	3.84	1.84	0

Source: SMEF Survey, 2008

1.9 Management Hierarchy

Table 1.49 is about management hierarchy. Taxonomically, ‘flat’ versus ‘hierarchical’ management structures are really the two polar divides that come to mind. The two terms are not necessarily unambiguously defined in the literature. Lay people would understand by flat management structure a rather loose, informal, fluid structure in which canons regarding relationships between tasks and briefs, chain of command and accountability, even rewards and rebukes, are not formalized. Such informality is frequently the mantle of micro and small, at times even medium-sized, enterprises.

Hierarchical management structures however set much larger store by codification and formalization, documentation and processes. Such processes are often written into business rules that get codified into the working of human resources software that get written so as to enforce such hierarchy in as much an impersonal manner as possible.

Respondents were asked to assess if their own management structures were flat in some 'general' manner. Their responses have been tabulated in Table 1.49 below. Several findings stand out. First, a full 50% of the sample respondents consider their own management model as being 'flat' in nature, while the remaining 50% think that theirs are a hierarchical management model. That said, secondly, important difference emerge between MiSmall and MeLarge establishments. Whereas as much as 60.23% of the sample establishments consider themselves to have 'flat' management structures, the corresponding percentage for the MeLarge establishments is only 32%.

Table 1.49: Profiles of the management structure in Leather and leathergoods industry, Bangladesh

	Units having a flat Mgmt structure		Units having a hierarchical Mgmt structure		All	
	No.	% of total	No.	% of total	No.	% of total
Micro	10	62.5	6	37.5	16	100
Small	43	59.72	29	40.28	72	100
Medium	13	43.3	17	56.7	30	100
Large	3	15	17	85	20	100
MiSmall	53	60.23	35	39.78	88	100
MeLarge	16	32	34	68	50	100
All	69	50	69	50	138	100

Source: SMEF Survey, 2008

1.10 Towards the formulation of growth strategy

The next topic is about growth strategy. But before we take growth strategy up, we have to remind ourselves that growth will need to be pro-poor. In a pro-poor scheme of things, we need to grasp, with some real accuracy, the process whereby the 'demand' for labour and capital drive themselves at the levels of the firms that comprise the world of manufacturing. After all, it is these drivers of factor demand in general and of labour in particular that any growth strategy will need ultimately to be about. We therefore have invoked a full-information model so as to estimate a system of 'input demand functions'. The factors or inputs considered are labour, fixed capital and material inputs. The following is the structure of the model. In order to estimate this system of equations, we employ Zellner's Seemingly Unrelated Regression Estimators (SURE). This estimator is the most appropriate when the disturbance term are correlated across the equations comprising a system of equation of the kind to be introduced in the appendix to this report. It is quite appropriate to say that it is in the determination of the labour demand and capital demand that we are most interested.

Labour demand:

We find that the labour demand function is negatively sloped in wage rate (lnW), which is what it should be. The regression coefficient is statistically highly significant.[75] We find that the labour demand function is positively sloped in product price (lnP), which is what it should be. The regression coefficient is statistically highly significant. We also find that the labour demand function is positively sloped in fixed capital (lnK), which is what it should be. The regression coefficient is statistically highly significant. We find that the labour demand function is negatively sloped in the dummy variable relating to automation (D_a), which is what it should be. The regression coefficient is statistically highly significant. The upshot is that this estimate of the labour demand equation is quite intuitive. It says that in order to stimulate the demand of labour by the establishments in the industry, efforts have to be made in order to lower the reservation price of labour. Reservation price is about the minimum opportunity cost that is consistent with the worker being able to reproduce its labour-selling power and thus deciding to supply labour. Essentially, reservation price revolves around workers' cost-of-living. Clearly, there is a lot that public policy can do about workers' cost of living. Foremost among them is about leveraging the cost of food as a policy variable.

Secondly, we find that the amount of labour that entrepreneurs demand is a positive function of the average product price they can charge. The higher the average product price, the more labour they tend to generate. Now product price is about the quality and the design of the product, its workmanship, the use of more expensive, more attractive and yet more user-friendly packaging material for the product. Ultimately, this is about the amount of industrial knowledge that goes into the product. Our results show that the higher is quotient of the application of knowledge embodied in the product, the larger is its knock-on effects on the demand for labour that it creates.
Thirdly, the amount of fixed capital that an enterprise has to work with also positively drives its need for worker. This implies that there is also a need, in the interest of spurring pro-poor growth, to increase the capital provisioning especially of MiSmall establishments. Such enhanced capital provisioning would energize their demand for labour, and would be good news for pro-poor growth.

Fourthly, the automation dummy has a negative and statistically highly significant coefficient. The higher is the index for automation, the lower is the demand for labour. There are times when entrepreneurs automate their business processes not necessarily because such automation is ultimately good for cash-gains but because everybody else is doing it too. That is, sometimes, automation can be copy-cat automation. And now we see that automation hurts the cause of human workers. There is therefore a need for programmes that increase the awareness of employers about the pernicious effects of automation in the workplace from the perspectives of pro-poor growth and therefore of 'corporate social responsibility'. This connection is easily worth the creation of a project which centers around the dissemination of greater managerial awareness about the antithetical effects of automation 'policies' that might be pursued by the management, and the livelihood compulsions of average blue-collar workers.

[75] Note that with SURE, it is z-statistics, rather than t-statistics, that is calculated in order to assess statistical significance of individual regression coefficients.

The demand for capital:

We find that the capital demand function is positively sloped in interest rates (lnI). Given that, as conventional wisdom would have it, credit rationing may well pervade the credit markets in Bangladesh, this result, which is *prima facie*, counter-intuitive, is ultimately sensible. This is saying in effect that the credit market is supply constrained, and that in order to obtain more credit, or to obtain a larger-sized credit contract, you will need to up the ante---by promising to raise the interest rate that you agree to service. This is a typical result of the presence of rationing in the market. We find that the capital demand function is positively sloped in product price (lnP), which is what it should be. The regression coefficient is statistically highly significant. We find that the capital demand function is positively sloped in the dummy variable relating to automation (D_a), which is what it should be. The regression coefficient is statistically highly significant. After all, firms need access to larger amounts of capital in order to move up the automation scale. The upshot is that this estimate of the capital demand equation is quite intuitive. It says that in order to stimulate the demand of capital' by the establishments in the industry, efforts have to be made in order to lower the prevailing interest rate so that access to capital becomes more and more affordable. Clearly, there is a lot that public policy can do about interest rates. Foremost among them is about empowering public-private partnerships (PPP) such as the Small and Medium Enterprise Foundation (SMEF) credit wholesaling programmes, and things like that.

Table 1.50: Towards the drivers of a growth strategy for leather and leathergoods Industry, Bangladesh

Explanatory variables	Regression coefficient	z-statistics
Labour demand equation		
Constant term		
Wage rate	-0.0056*	-1.96
Price of output	0.0008214*	3.4
Fixed Capital	0.0000202*	3.06
Dummy for automation	3.44*	10.75
Output	1.05E-06*	5.68
Dummy for Dhaka	-0.559*	-2.06
Dummy for Chittagong	0.3059	0.57
Capital demand equation		
Constant term		
Interest rate	0.0145	0.45
Price of product	-0.000094	-0.18
Output	1.11E-06*	2.77
Dummy for automation	8.309*	11.14
Dummy for Dhaka	-0.58	-0.94
Dummy for Chittagong	0.379	0.31
Material input demand equation		
Constant term		
Input price	-0.039*	-4.94
Output	2.52E-06*	7.25
Dummy for automation	9.2567*	18.68
Dummy for Dhaka	-0.693	-1.3
Dummy for Chittagong	-0.726	-0.69

Source: SMEF Survey, 2008

The next topic is about growth strategy. But before we take growth strategy up, we have to remind ourselves that growth will need to be pro-poor. In a pro-poor scheme of things, we need to grasp, with some real accuracy, the process whereby the 'demand' for labour and capital drive themselves at the levels of the firms that comprise the world of manufacturing. After all, it is these drivers of factor demand in general, and of labour in particular that any growth strategy will need ultimately to be about. We therefore have invoked a full-information model so as to estimate a system of 'input demand functions'. The factors or inputs considered are labour, fixed capital and material inputs. The following is the structure of the model. In order to estimate this system of equations, we employ Zellner's Seemingly Unrelated Regression Estimators (SURE). This estimator is the most appropriate when the disturbance term are correlated across the equations comprising a system of equation of the kind to be introduced in the appendix to this report. It is quite appropriate to say that it is in the determination of the labour demand and capital demand that we are most interested.

Labour demand:

We find that the labour demand function is negatively sloped in wage rate (lnW), which is what it should be. The regression coefficient is statistically highly significant.[76] We find that the labour demand function is positively sloped in product price (lnP), which is what it should be. The regression coefficient is statistically highly significant. We also find that the labour demand function is positively sloped in fixed capital (lnK), which is what it should be. The regression coefficient is statistically highly significant. We find that the labour demand function is positively sloped in the dummy variable relating to automation (D_a). The regression coefficient is statistically highly significant. Finally, output has a strong and positive coefficient in the labour demand function.

The upshot is that this estimate of the labour demand equation is quite intuitive. It says that in order to stimulate the demand of labour by the establishments in the industry, efforts have to be made in order to lower the reservation price of labour. Reservation price is about the minimum opportunity cost that is consistent with the worker being able to reproduce its labour-selling power and thus deciding to supply labour. Essentially, reservation price revolves around workers' cost-of-living. Clearly, there is a lot that public policy can do about workers' cost of living. Foremost among them is about leveraging the cost of food as a policy variable.

Secondly, we find that the amount of labour that entrepreneurs demand is a positive function of the average product price they can charge. The higher the average product price, the more labour they tend to generate. Now product price is about the quality and the design of the product, its workmanship, the use of more expensive, more attractive and yet more user-friendly packaging material for the product. Ultimately, this is about the amount of industrial knowledge that goes into the product. Our results show that the higher is quotient of the application of knowledge embodied in the product, the larger is its knock-on effects on the demand for labour that it creates.
Thirdly, the amount of fixed capital that an enterprise has to work with also positively drives its need for worker. This implies that there is also a need, in the interest of spurring pro-poor growth, to increase the capital provisioning especially of MiSmall

[76] Note that with SURE, it is z-statistics, rather than t-statistics, that is calculated in order to assess statistical significance of individual regression coefficients.

establishments. Such enhanced capital provisioning would energize their demand for labour, and would be good news for pro-poor growth.

Fourthly, the automation dummy has a positive and statistically highly significant coefficient. The higher is the index for automation, the higher is the demand for labour. There are times when entrepreneurs automate their business processes in such a manner that by simultaneously raising the rate of production also raises the demand for labour, especially in peripheral and support functions, such as packaging, storing, manning security arrangements. If this happens, automation can in principle have a positive coefficient on this particular function. Automation need not forever lead to contract the number of jobs offered by a firm. It depends upon on what kind of automation one is talking about, and how successful automation is in raising the output level of the firm in question.

Fifthly, output is a strongly positive and statistically significant coefficient of labour demand.

The demand for capital

We find that the capital demand function is positively sloped in interest rates (lnI): the regression coefficient is algebraically tiny and is statistically insignificant. Given that, as conventional wisdom would have it, credit rationing may well pervade the credit markets in Bangladesh, this result, which is *prima facie*, counter-intuitive, is ultimately sensible. This is saying in effect that the credit market is supply constrained, and that in order to obtain more credit, or to obtain a larger-sized credit contract, you will need to up the ante---by promising to raise the interest rate that you agree to service. This is a typical result of the presence of rationing in the market. We find that the capital demand function is negatively sloped in product price (lnP). However, the regression coefficient is statistically insignificant. We find that the capital demand function is positively sloped in the dummy variable relating to automation (D_a), which is what it should be. The regression coefficient is statistically highly significant. After all, firms need access to larger amounts of capital in order to move up the automation scale. And finally, output is a strongly positive and statistically significant coefficient of capital demand.

The upshot is that this estimate of the capital demand equation is quite intuitive. It says that in order to stimulate the demand of capital by the establishments in the industry, efforts have to be made in order to lower the prevailing interest rate so that access to capital becomes more and more affordable. Clearly, there is a lot that public policy can do about interest rates. Foremost among them is about empowering public-private partnerships (PPP) such as the Small and Medium Enterprise Foundation (SMEF) credit wholesaling programmes, and things like that.

Material input demand:

We find that the input demand function is negatively sloped in own price, which is what it should be. The regression coefficient is statistically highly significant. We find that the input demand function is positively sloped in product price (lnP), which is what it should be. The regression coefficient is statistically highly significant. We also find that the labour demand function is positively sloped in automation dummy (D_a). The regression coefficient is statistically highly significant. The regression coefficient is statistically highly significant. Finally, output has a strong and positive coefficient in the labour demand function.

The upshot is that this estimate of the input demand equation is quite intuitive. It says that in order to stimulate the demand of inputs by the establishments in the industry, efforts have to be made in order to lower prices of raw materials. What implications does that have for policy making? It says that macroeconomic stability must be maintained, so that the inflation rate can capped at an appropriate level. This is needed in order for an environment of price stability to be in force. Policies that work on keeping as low as possible the reservation price of labour also implicated in this particular content. As said already, reservation price of labour is about the minimum opportunity cost that is consistent with the worker being able to reproduce its labour-selling power and thus deciding to supply labor. Essentially, reservation price revolves around workers' cost-of-living. To reiterate, clearly, there is a lot that public policy can do about workers' cost of living. Foremost among them is about leveraging the cost of food as a policy variable.

1.10.1 The achievement of growth on the sample

We measured the extent of growth using four variables, namely, employment, equity, revenue and number of machines. Using the following formula, we calculate compound annual growth rate in each of these variables over the life-cycles of the firm for each of the firms on the sample. We then presented average compound annual growth rates across firm size classes. The formula is:

$R_i = \exp((\ln(E_t)-\ln(E_0))/n)-1$, where R is the growth rate, E_t is headcount in study year, E_0 is headcount in start-up year, n is the number of years of firm's life since start-up, exp is code for exponentiation, and 'i' is an index at firm-level.

Table 1.51: Average compound annual growth rate achieved by firms in leather and leathergood industry over their lives

Firm size class	Growth in selected variables per year over the life of firms in			
	Head count	Equity	Revenue	Machine
Micro	-0.67	10.72	7.9	.99
Small	9.16	10.39	22.17	4.2
Medium	12.5	9.83	25.1	4.5
Large	8.38	9.02	24.98	8.98
MiSmall	7.39	10.45	19.82	3.86
Melarge	10.82	9.5	25.1	6.13
All	8.6	10.13	21.8	4.78

Source: SMEF Survey, 2008

In this industry, average annual growth rate in employment level per firm is found to be 8.6%; that in equity is found to be 10.1%; that in revenue, 21.8%; and that in the number of machines, 4.78%.

Table 1.52 then explains the inter-firm variations in growth rates achieved per year by sample firms. Following results emerge from it. First, an outstanding result is that age of the firm ---the number of years since its birth --- is strongly and inversely related with the growth achieved. The regression coefficient of age of the firm is negative and statistically significant in each of the four equations estimated. In lay terms, this result is strongly suggestive of a 'generation gap' among firms' prognosis for growth: younger firms are on higher growth trajectories. Second, the educational attainment of the Managing Director returns a significantly positive coefficient on the growth rate function in the number of machines.

Table 1.52: Towards the drivers of a growth strategy for Designer Goods Industry, Bangladesh

	Dependent variable is compound growth rate in							
	Headcount		**Equity**		**Revenue**		**No. of machines**	
	Coeff.	**T-stat.**	**Coeff.**	**T-stat.**	**Coeff.**	**T-stat.**	**Coeff.**	**T-stat.**
Const	.484*	3.274	0.389	0.96	1.035**	1.862	1.501*	3.517
Age of unit	-.104*	-7.89	-.183*	-5.07	-.189*	-3.739	-.198*	-5.927
education	-0.026	-0.649	0.012	0.109	-0.0466	-0.311	.204**	1.863
cluster	0.007	0.244	0.072	0.921	-.162	-1.503	-0.095	-1.435
average product price	-0.011	-0.561	0.001	0.011	-0.0007	-0.009	-.126**	-1.796
fixed capital per h.c.	-0.005	-0.611	0.013	0.649	-0.0028	-0.1	-.039**	-1.78
% of output exported	-2.6E-05	-0.107	0.000	-0.42	0.0012	1.293	0.0005	0.69
Input_intensity	0.0002	0.387	0.001	0.85	-.0025**	-1.698	-0.001	-1.253
bank loan dummy	0.032	1.271	-0.019	-0.273	-0.123	-1.246	0.031	0.505
Firm size dummy 1	-0.101	-1.56	0.002	0.011	-0.0344	-0.136	-0.157	-0.662
Firm size dummy 2	-0.048	-1.37	-0.018	-0.175	0.0367	0.253	-.152**	-1.67
Firm size dummy 3	-0.033	-0.926	0.008	0.083	.218	1.549	-0.03	-0.374
District Dhaka	-0.045	1.28	.149	1.546	-0.043	-0.33	-.163*	-2.039
District Chittagong	0.010	0.188	-0.04	-0.284	-0.344	-1.818	-.175*	-1.514
R-squarred								

Source: SMEF Survey, 2008

1.10.2 Growth strategy in the Leather and leathergoods industry

Growth strategy is primarily a matter in which development economists are interested. Because growth itself owes to two broad classes of source, a growth strategy will be about activities that channelization of two kinds of resources into the industries of interest. The following is a definition of a growth strategy that we employ in this study:

"A growth strategy is a coherent organization of initiatives, especially by the government and public-private partnership (PPP) sector, that have demonstrably positive effect on both factor accumulation and factor productivity growth in the sector of interest".

There are two keywords in this definition that it is worth drawing particular attention to. First, the initiatives must have a demonstrably positive effect on both factor accumulation and factor productivity growth, based on statistically significant regression coefficients. We shall carry out multivariate regression equations to explain statistical variations in two classes of variables, namely, factor accumulation and factor productivity. Only factors that have statistically significant coefficient in these regressions warrant inclusion in a growth strategy. Quality money and time will potentially be invested in implementing the sector growth strategies that this work will help spawn. It is therefore imperative that the initiatives and interventions that we highlight must pass muster based on rigorous statistical tests involving causalities that are theoretical sound and intuitive.

1.10.3 Towards a Growth strategy for the Designer goods industry

Results from the SURE estimation point up several strategic directions to foster growth in the designer goods industry of a type that spurs the demand for labour. First, policies that work on macroeconomic stability and keep in check inflation rate are important. As well, policies that help in keep relatively low and stable the prices of 'wage goods'---food, clothing, fuel, housing rents, etc---will be needed in order to keep labour's reservation price in check. Secondly, interventions are needed in order to improve access to finance, especially for the MiSmall class of firms. Thirdly, the entrepreneurs need assistance in order to upgrade the quality, turn-around, functionality, etc of their products, as relatively high product price strengthen the demand for labour. Fourthly, naturally anything that is positive for capacity utilization is, via the route of the positive effect of measured output on the demand for labour, also good for the latter.[77] Finally, any intervention that helps lowering the market prices of hides and industrial chemicals provides a positive fillip to the demand for raw materials and chemicals. Enhancing the access to credit in the livestock sector, including by broadening and deepening the outreach of micro credit, will potentially help with augmenting supplies and at least keeping prices of hides relatively stable.

We also tapped the opinions of our esteemed respondents about their perceptions of which various growth motivators or impediments they would much rather have assistance. We have analyzed their responses. Several findings rate a mention. First, the largest single percentage (18%) of suggestions fingered high bank interest rates as a kind of 'black eye' from which relief is urgently sought by the survey respondents. We can take it that reforming the financial sector is the fourth most important strategic task before the country. Second, sixteen percent fingered erratic supply of raw material as a drag that needed fixing. Third, about fourteen percent spoke out in favour of government's 'pro-industry' policy-set. About eleven percent spoke strongly in favour of relaxing the huge constraint in terms of the supply of electricity to the national grid. This closes our discussion concerning the formulation of a strategy for the growth of the leather and leathergoods industry.

Table 4.53: Entrepreneurs' own recommendations that will assist them

Prescriptions	Percent of cases
Reducing interest rates charged by banks	18.7
Uninterrupted supply of raw materials	16.5
Government's 'pro-industry' policy-set	13.7
Uninterrupted power supply	10.8
Increasing buyers/ orders	8.6
Easy loan system	7.2
Political stability	3.6
Arrangement of international fair	2.1
Others	18.5
Total	100

Source: SMEF Survey, 2008

[77] We shall desist from discussing the strategic implications of the SURE results with regard to the other two equations estimated. We leave this to be a pleasant duty of the reader to reach their own conclusions based on those two equations.

1.10.4 Perceived Impact of the Regulatory Regime in the Leather and Leathergoods Industry

Respondents were asked the following question: "Of the following interventions by the Government of Bangladesh in the way of regulatory regime, which one(s) do you consider to be a major impediment from the perspective of the growth prospects of your firm?" The answers obtained from respondents in the designer goods industry have been tabulated, in percentage form, in Table 4.54.[78] Overall, of the four regulatory regime 'intrusions' that receive the most frequent negative billing, as many as three have to do with National Board of Revenue (NBR)---namely, income tax assessment, VAT administration (assessment plus realization), the issue of a Tax Identification Number (TIN). Of course NBR has a very important role to perform as center-piece of the government's resource-mobilization effort. Direct taxes have of course to be assessed, collected, administered: domestic resource mobilization effort is of supreme importance. Surely, the necessity for appropriate taxation will sometimes become a kind of blind spot from the viewpoint of an entrepreneur in any given manufacturing industry. That said, it is of great importance that VAT administration is the second most oft-quoted regulatory 'impediment' to the perceptions of the entrepreneurs. In particular, the percentage fingering VAT as the 'stickiest wicket' is the highest for the micro firms. There is genuinely a major 'miscarriage of competitive justice' in the very high probability of 'double VAT taxation' to the detriment of MiSmall firms. We don't have to go into the details of this 'running sore': for a description, see Chowdhury *et al.* 2005.

Table 4.54: Respondents' perceived impediments arising from regulatory regime, leather and leathergoods industry, Bangladesh

Farmsize classes	Vat interfare	Income tax	Trade Lisence	Tin Issue	Environment rules	BSTI	Boiler experiment	CIFE	Govt. purchage	Others
Micro	56.2	75.0	68.8	68.8	75.0	12.5	12.5	6.25	31.2	0
Small	64.4	78.1	71.2	69.9	63.0	24.6	30.1	23.2	35.6	2.7
Medium	76.7	83.3	83.3	70.0	60.0	40.0	50.0	43.3	33.3	0
Large	85.0	70.0	80.0	75.0	75.0	65.0	50.0	50.0	45.0	0
MiSmall	62.9	77.5	70.8	69.7	65.2	22.4	27.0	20.2	34.8	2.2
MeLarge	80.0	78.0	82.0	72.0	66.0	50.0	50.0	46.0	38.0	0
All firms	69.1	77.6	74.8	70.5	65.6	32.3	35.2	29.5	36.0	1.4

Source: SMEF Survey, 2008

1.11 Tactical Action Plan

1.11.1 Needs assessment:

A hide must be carefully skinned and protected both in storage and transportation before reaching the tannery. A hide will begin to decompose within hours of an animal's death; to prevent this from happening, the hide is cured by a dehydrating process that involves either air-drying, wet or dry salting, or pickling with acids and salts before being shipped to a tannery. In Bangladesh, dry salting is the method of

[78] Respondents are free to flag more than one regulatory regime 'intrusions' as being sufficiently negative. That is why there is no remit in expecting these percentages to add up any particular number.

universal use. However, as the following shows clearly, because of the peaking of the availability of raw hides just after the Eid-ul-Azha, the industry runs short of usable salt during that peak season. As a result, the quality of raw hide during the peak period of the tanneries getting a hold of about 40% of their sourcing for the whole year is less than can be desired. This is because salt in adequate quantities can not be ensured during the all-important peak season.

1.11.1.1 Action plan:

An effort to network the merchants of Dhaka's old hides market at *posta* into the major salt producers of Chittagong and Cox's Bazar would appear to have priority.

1.11.2 Needs assessment:

The hide is soaked to remove all water-soluble materials and restore it to its original shape and softness. Hair is loosened usually by a process called liming, accomplished by immersing the hides in a mixture of lime and water. The hide is then washed, delimed, bated (the enzymatic removal of nonfibrous protein to enhance color and suppleness), and pickled (to provide a final cleansing and softening). Bating and pickling are hardly, if ever, used in Bangladesh's tanneries. These is a need to raise awareness about the positive effects of bating on colour and suppleness of hides. There is a need to organized capacity building workshops in the tanning cluster(s) about best-practices of using enzymatic treatment of nonfibrous protein to enhance colour and suppleness.

1.11.2.1 Action plan:

In an effort to improve the colour and suppleness especially of Bangladesh's cow hides, especially from the butt-side of the cow's hide, an effort involving the Bangladesh College of Leather Technology (BCLT) and Bangladesh Leather Exporters' Association need to be launched in order to improve the cultural practices. Especially, the feasibility of using bating and pickling ought to be appraised.

1.11.2.2 Needs assessment:

After the basic tanning process is completed, the pelts are ready for processing, the final phase in leather production. The tanned pelt is first thoroughly dried and then dyed to give it the appropriate color. The installation of mechanical dryers take a good deal of space, and Bangladesh's tanneries, being located in a part of Dhaka where land value is hundreds of millions, are short of space. Most therefore dry their tanned hides by hanging, in room temperature. There is need therefore to do something concrete in terms of the drying deficiency in the sector.

1.11.3 Action:

The SME Foundation in collaboration with the Bangladesh Leather Exporters and Manufacturers Association should help upgrade the availability of mechanical drying capacities within the leather-tanning cluster.

1.11.3.1 Needs Assessment:

Most of Bangladesh's dyeing uses drum dyeing. common methods include drum dyeing, spraying, brush dyeing, and staining. Blended oils and greases are then incorporated into the leather to lubricate it and to enhance its softness, strength, and ability to shed water.

Over many years of practice, the tanning industry has become used to chrome tanning. Chrome tanning has many positive, and turns job batches in short order, while passing muster in terms of many of the tests that leather technologists can throw their gauntlets on.[79] And yet buyers are increasingly demanding 'eco-friendly' leather. Upgrading to 'eco-friendly' tanning will put a premium on phasing out chrome tanning, and involve a migration to enzymatic removal of the undesirable proteins from the tanned objects. No doubt, major players in the tanning markets in South Asia region is not as yet ready for porting all production processes to 'eco-friendly' tanning. However, it is high time that leadership in the industry gear up in order at least to raise awareness among the entrepreneurs about the imperative of the upgrading. Some entrepreneurs are willing to migrate their operation in phases, but, when pressed for the reasons why they don't start porting, point out that the talent pool is too shallow to allow a harmonious migration to 'eco-friendly' tanning. This discourages the move towards 'eco-friendly' tanning.

1.11.3.2 Action plan:

As a part of a sector development programme, the Bangladesh College of Leather Technology (BCLT) and the Bangladesh Leather Manufacturers and Exporters Association might capitalize an R & D 'laboratory' under collaboration of the Technology and Enterprise Support Services (TESS). The specific objective of this intervention would be about creating an embryonic capability within the cluster of Hazaribagh with respect to establishing the core of what might be called 'enzymatic skill taskforce' in the BCLT. The tasks for such a 'laboratory' would need to be defined at more of an abstract, conceptual, level. It will need to be implemented more as an experiment. The two sponsors (the BCLT and BLMEA) will need to enter into an MOU. In addition, they will need to enter into arrangements with one of the several medium-sized tanneries that currently make a living by leasing their standing facilities. The production-oriented aspects of the project could well take place at this rented-in facility.

1.11.3.3 Needs assessment:

The leather is dried to about 14 percent moisture. For countries and companies that take high class tanning seriously, drying is a very important process. World class tanners use either air or drying tunnels. Alternatively, they will first stretch the leather and then use air or tunnel, drying it. Both require some space. However, in the for ever congested Hazaribagh, space has always been on a premium. Drying is therefore almost invariably done in the open air, even though some notional tunneling is involved. The reliance is primarily on the ambient temperature within the tanning

[79] Such tests include (a) softness test; (b) tensile strength test; (c) percent elongation at break test; (d) water vapour permeability test; (e) bonding test of finished film; (f) colour fastness test; (g) water penetration test; (h) shrinkage temperature test; (i) rub fastness test.

plant. This often does not lead to the right extent of drying, especially when it comes to the heavier cow or buffalo hide.

Also, there is a genuine demand for facilities and machinery of the kind needed to port hides from the wet-blue stage to a finished product.[80] The machines that we are talking about here are as follows:

(1) Sammaing machines;
(2) Shaving machines;
(3) Sammeing setting machines;
(4) Splitting machines;
(5) Vacuum dryers;
(6) Tunnel dryers
(7) Toggle dryers
(8) Milling drums
(9) Ironing machines;
(10) Plating drums;
(11) Glazing drums;
(12) Spraying machines

Action

A common facilities centers, fitted out with machines cited in the foregoing could, if the authorities so desired, be set up in the new cluster being planned by the Ministry of Industries in the Savar area. SMEF could consider capitalizing it. The TESS of the SMEF would have to recruit a professional Leather Technologist to set the CFC up and manage it. Land will need to be acquired, of course. Throughout the process of the installation of the CFC, SMEF's team leader (the Leather Technologist) will need to liase actively with the Bangladesh Leather Manufacturers and Exporters' Association, so that there is an adequate degree of 'user' buy-in. SME Foundation will only commit equity towards the creation of such a CFC if there is no worthwhile private entrepreneur who seems willing to take the risk and if an accurate appraisal were to establish beyond any shadow of reasonable doubt that the CFC would indeed value. It is known that some land has already been earmarked for the establishment of CFC and common effluent plant on the proposed site for the leather cluster near Savar. Could this be possible to allot that plot to the SMEF or, better still, to a consortium to be formed comprising the BSCIC and the SMEF?

[80] The evidence for this is best illustrated by an anecdote. Several years ago, the industry and academia in the form of the BCLT agreed that the tanners would be given access to the facilities in the BCLT, which are quite rich and well-fitted-out, in lieu of the former paying a reasonable 'user cost'. This offer made waves in the industry, especially among many tanners who were not satisfied with the quality of their own 'crusting' and 'finishing' setup, and were therefore all too happy to have an alternative. This crowd especially included the hundreds of 'job-workers' who had tanning brains but no 'brawn'. Before long, the ensuing excess demand first caused circumstances of queuing, and subsequently 'queue-jumping': musclemen among the tanners resorted first muscling in and subsequently to the direct use of force. Fist-fights flared up, and soon escalated into gun-fights. Before long, the innovative scheme was shelved, as especially of the college principal, an otherwise highly regarded and peaceable educationalist, and his colleagues had often to go out on their limbs. While the scheme died, it however proved that the demand for common facilities centers, especially by entrepreneurs of small means of the kind that SMEF need to assist and support is a real one.

Needs Assessment:

Bangladesh has capabilities in manufacturing. This is slowly gaining prominence. Bangladeshi expertise in skill intensive manufacturing sectors such as auto components, textiles, pharmaceuticals etc. gives it an edge over other low wage producing countries. Though many other countries can provide low skilled labour force at low wages, requirement of high technologies into manufacturing is making Bangladesh a reasonable hub especially for the manufacture of light-weight goods. This is evident from the number of who have invested in the private export processing zones in Bangladesh.

This makes it quite necessary to select the leather and leathergoods industry as a 'booster' sector for which to prepare a full sector development programme on what is these called a 'mission-mode'.[81] The case of leather as a subject for a 'mission-mode' development makes a great deal of strategic sense at present. This is because Bangladesh has a strong comparative advantage in the production of milk and milk-based products. Because the cost of hides is the single most important component of the cost of producing leather, this argument naturally implies that Bangladesh also has a strong comparative advantage in the production of leather and leathergoods. The fact that tier-1 producing countries such as China has officially been putting the production of leather on a 'back-burner' only further underscore the advantage of leather production in Bangladesh.

Action

It is recommended that the SMEF puts forward the leather and leathergoods sector for development on a 'mission-mode'.

Needs assessment:

Environmental activism has become a rallying cry in the markets for leathergoods in many rich countries. This activism is about whether exporting countries, and firms in them, do enough to mitigate the downstream effects of the negative externalities (ie the spewing of harmful and possibly carcinogenic effluents) unleased by the production of leather. Many buyers hailing from rich countries increasingly stick it out with whether the Bangladeshi firms from whom they buy have an effluent plant. Thus for instance Bangladesh's largest leathergoods firm, which is a German-Bangladeshi joint venture, in increasingly putting pressure on Bangladesh's largest tanning companies, from whom they buy finished leather, to invest in effluent treatment plant. Gradually, this will become an all-consuming trend. Need exists to enable as many Bangladeshi firms as possible to invest in effluent-treatment plants. It has been discovered that when tanneries will have moved to the new location in Savar, it might be possible for firms with adjacent plots to site the effluent plants on their boundaries, thus securing an important economy in terms of the land required. The investment costs per participant would also them be halved---an important source of pecuniary externality. However,

[81] The Government of India at times works on a 'mission mode'. The keyword here is the word mission. When the development of any given industry or sector is adopted on a mission-mode, what actually happens is that a mission is thrashed out for an inter-ministerial committee of all concerned ministries and the powerful Planning Commission. The development of the cited industry or the sector then become the leitmotif characterizing all activities of this particular committee. The UDA government of India under the leadership of Dr. Manmohon Singh has adopted the development of leather and leathergoods as worthy of being accorded a 'mission-mode'.

rivalries, lack of trust prevailing among firms in the industry could well turn this reciprocity and mutual advantage a kind of blind-spot for private-sector rivals. In that case, this lacuna will have become a *market failure*, and its mitigation will turn on whether a public-private partnership effort could be launched. This effort would be about creating a climate, through awareness-raising and coordination, where greater mutual trust and collaboration led to joint building design, construction, use and maintenance---all leading to a higher private payoff.

Action

It is recommended that the SMEF puts the leather and leathergoods sector as a major element of the its agenda for efficient and inclusive growth in the manufacturing industries. That done, we recommend that the SMEF launches in-depth but an in-house sector development programme for the upgrading of capacity, infrastructures, human resources and financing avenues for the development of the leather and leathergoods sector. Towards this end, the SMEF should recruit a leather technology consultant for long-term appointment with it. That incumbent would be tasked to conceive ways and means of implementing the present tactical action plan. In the process of implementing it, the incumbent leather technologist would also have the mandate of adding new, and more specifically conceived new elements to this action plan.[82]

Needs Assessment

Consumer activism in rich countries is increasingly and successfully putting pressures on companies to become more and more demanding about 'eco-friendly' leather. One essential element of such a regime is about putting in place effluent treatment plants by major exporters.

Action

It is recommended that SME Foundation increase its commitment of financial resources towards the acquisition of greater in-house technical specialization relating to the environmental-compliance issues in general, and the technical minutiae of setting up common effluent treatment plants in the tanning cluster now under negotiation.

Actions must be taken to enhance affordable supply of credit to the designer goods industry, especially to 'micro' and 'small' firms in the industry. Towards this end, the SME Foundation ought to try to 'fast-track' the onset of credit wholesaling in a targeted manner to firms in production clusters that have achieved critical supply mass in a national context.

The SMEs in general and the firms in the MiSmall class of firm need to be proactively mainstreamed into being more abundant users of information and communications technologies. The SME Foundation would certainly like to become even more involved in harnessing the ICTs for the management and dissemination of knowledge and knowledge-based public-goods inputs for advancing the common good of the producers and players of the leather and leathergoods goods industry of Bangladesh.

[82] It is not unusual at all that a client would retain the services of professional consultant(s) in order to do due diligence, appraise the ideas and conceptions that often take the often embryonic formulations in a large report, like the present one, of which the tactical action plan is one, albeit important, part. And such appraisal is a quite necessary part of building the 'architecture' for a sector development programme.

Annex-1

Harnessing Stochastic Production Frontier in search for diagnostic wisdom

The point of the presentation of this model, and some results based on it in Section 2.0, is to demonstrate that it is practicable to glean valuable diagnostic results from a dataset generated with policy research in mind.

Estimation of the SPF requires a particular functional form of the production function to be imposed. A range of functional forms for the production function frontier are available, with the most frequently used being a translog function, which is a second order (all cross-terms included) log-linear form. This is a relatively flexible functional form, as it does not impose assumptions about constant elasticities of production nor elasticities of substitution between inputs. It thus allows the data to indicate the actual curvature of the function, rather than imposing *a priori* assumptions. In general terms, this can be expressed as:

$$\ln Q_{j,t} = \beta_0 + \sum_i \beta_i \ln X_{j,i,t} + \frac{1}{2}\sum_i \sum_k \beta_{i,k} \ln X_{j,i,t} \ln X_{j,k,t} - u_{j,t} + v_{j,t}$$

where $Q_{j,t}$ is the output of the establishment j in period t and $X_{j,i,t}$ and $X_{j,k,t}$ are the variable and fixed establishment inputs (i,k) to the production process. As noted above, the error term is separated into two components, where $v_{j,t}$ is the stochastic error term and $u_{j,t}$ is an estimate of technical inefficiency.

Alternative production functions include the Cobb-Douglas and CES (Constant Elasticity of Substitution) production functions. The Cobb-Douglas production function is given by:

$$\ln Q_{j,t} = \beta_0 + \sum_i \beta_i \ln X_{j,i,t} - u_{j,t} + v_{j,t}$$

As can be seen, the Cobb-Douglas is a special case of the translog production function where all $b_{i,k}$ = 0. The production function imposes more stringent assumptions on the data than the translog, because the elasticity of substitution has a constant value of 1 (i.e. the functional form assumption imposes a fixed degree of substitutability on all inputs). And the elasticity of production is constant for all inputs (i.e. a 1 percent change in input level will produce the same percentage change in output, irrespective of any other arguments of the function).

The CES production function is given by:

$$Q_{j,t} = \gamma\left[\delta X_{i,j,t} + (1-\delta)X_{2,j,t}\right]^{-1/\theta} - u_{j,t} + v_{j,t}$$

where q is the substitution parameter related to the elasticity of substitution (i.e. q = (1/s)-1 where s is the elasticity of substitution) and d is the distribution parameter. The CES production function is limited to two variables, and is not possible to estimate in the form given in (7) in maximum likelihood estimation (MLE) (making it unsuitable for use as the basis of a production frontier). However, a Taylor series expansion of the function yields a functional form of the model that can be estimated, given as:

$$\ln\left(\frac{Q_{j,t}}{X_{2,j,t}}\right) = \ln\gamma + (\upsilon-1)\ln X_{2,j,t} + \upsilon\delta\ln\left(\frac{X_{1,j,t}}{X_{2,j,t}}\right) - \frac{1}{2}\upsilon\theta\delta(1-\delta)\left[\ln\left(\frac{X_{1,j,t}}{X_{2,j,t}}\right)\right]^2 - u_{j,t} + v_{j,t}$$

The model can be estimated as a standard or frontier production function, and the parameter values derived through manipulation of the regression coefficients. The functional form in (8) can be shown to be a special case of the translog function where $b_{i,i} = b_{k,k} = -0.5b_{i,k}$.

Given that both the Cobb-Douglas and CES production functions are special cases of the translog, ideally the translog should be estimated first and the restrictions outlined above, tested. However, the large number of variables required in the process of estimating the translog may cause problems if a sufficient data series is not available, resulting in degree of freedom problems. In such a case, more restrictive assumptions must be imposed.

To estimate the stochastic production frontier, an appropriate functional form is assumed (i.e. Cobb-Douglas, CES or Translog production function) and the parameters of the model (including s^2_v and s^2_u) are estimated by MLE. Estimation of the maximum value of the log likelihood function is based on a joint density function for the split error term $e_j = v_j - u_j$ (Stevenson, 1980). From this, technical efficient capacity utilization (TECU) can be calculated for the individual firm, given by:

$$E\left[\exp(-u_j)\middle|\varepsilon_j\right] = \frac{1-\Phi(\sigma_A + \gamma\varepsilon_j/\sigma_A)}{1-\Phi(\gamma\varepsilon_j/\sigma_A)}\exp(\gamma\varepsilon_j + \sigma_A^2/2)$$

where, $\sigma_A = \sqrt{\gamma(1-\gamma)\sigma_s^2}$, $\sigma_s^2 \equiv \sigma_u^2 + \sigma_v^2$, $\gamma \equiv \sigma_u^2/\sigma_s^2$

and Φ is the density function of a standard normal random variable (Battese and Coelli, 1988). From this, if g = 0, then the expected value of the TECU score is one. That is, there are no deviations due to technical inefficiency or capacity underutilization (i.e. $\sigma_u^2 = 0$). If g = 1, then all deviations are due to technical inefficiency and capacity underutilization (i.e. $\sigma_v^2 = 0$). Hence if 0< g<1, deviations are characterized by both TECU and a random or stochastic component (Battese and Corra, 1977).

In order to separate the stochastic and TECU effects in the model, a distributional assumption has to be made for u_j (Bauer, 1990). From the literature on technical efficiency estimation, four distributional assumptions have been proposed: an exponential distribution i.e.

$u_j \approx \exp(\theta)$

(Meeusen and van der Broeck, 1977); a normal distribution truncated at zero, for example, $u_j \approx \left|N(\mu_j, \sigma_u^2)\right|$ (Aigner, Lovell and Schmidt, 1977); a half-normal distribution truncated at zero i.e. $u_j \approx \left|N(0, \sigma_u^2)\right|$ (Jondrow *et al.*, 1982); and a two-parameter Gamma / normal distribution (Greene, 1990).

There are no *a priori* reasons for choosing one distributional form over the other, and all have advantages and disadvantages (Coelli, Rao and Battese, 1998). For example, the exponential and half-normal distributions have a mode at zero, implying that a high proportion of the firms being examined are perfectly efficient. The truncated normal and two-parameter gamma distribution both allow for a wider range of distributional shapes, including non-zero modes. However, these are computationally more complex (Coelli, Rao and Battese, 1998). Empirical analyses suggest that the use of the gamma distribution may be impractical and undesirable in most cases. Ritter and Simar (1997) found that the requirement for the estimation of two parameters in the distribution may result in identification problems, and several hundreds of observations would be required before such parameters could be determined. Further, a maximum of the log-likelihood function may not exist under some circumstances. Bhattacharyya *et al.* (1995), however, offer one approach for selecting the distribution to reflect technical inefficiency; they suggest the use of a data generating process.

Technical efficiency (TE) measures the relationship between a establishment's inputs to the manufacturing process and its outputs, with full efficiency being achieved when outputs are maximised from a given set of inputs. Inputs can be fixed (e.g. the machinery, looms, engine, other equipment, etc.) or variable (e.g. labour input, working capital, etc). Fixed inputs may also be intangible, such as entrepreneur’s skill and quality differences between technologies. TE scores can be calculated using the econometric stochastic production frontier (SPF).

In the present case, we opt for Cobb-Douglas as the form of the production function to provide a kind of initial estimate of the stochastic frontier. Using Maximum Likelihood Estimates of such a production function, we obtain the sample variances of the normally distributed error component, and the ‘irregular’ error component with a truncated distribution. Using these, it is possible to calculate the value of the frontier, as also the value returned for each of the sample observation for the efficiency or capacity variable of choice. We picked gross value added as our measure of ‘efficiency’. By deducting the value obtained for the observation from the frontier, we obtain a measure of the ‘distance’. It is this distance that we then regress on a large number of explanatory variables, each of whom has a certain diagnostic value.

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Volume-7

Bangladesh's Light Engineering Industry, baseline, profile, performance and plans for upgrading

Professor Dr. M. Kamal Uddin
CDS Team of Consultants

A study for SME Foundation, Dhaka

By

Center for Development Studies, Dhaka

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Chapter 1

Scenario of Light Engineering Sector in Bangladesh

.1 Role of Light Engineering Sector on the Economy

Light Engineering Industries (LEIs) have historically been acting pivotal role in the industrial enterprise landscape locally and within economies globally. Especially growth with clear benefits for poverty reduction puts a premium on integrating, productivity and profitably, Light Engineering Industries in the very process of economic growth. In the present era, all progressive countries as a part of their development strategy have been intensifying their efforts to develop Light Engineering Sector (LES) which acts as prime mover for growing a country's industrial base. Light Engineering Sector occupies a unique position in the economy of Bangladesh as well and plays a vital role in the socio-economic development of the country. These industries have potentials to make significant contribution towards technological and economic development along with wide opportunities for employment generation. Analysis shows that these small & medium scale industries have made substantial contribution to Gross Domestic Product (GDP) during the last few decades and created appreciable employment opportunities. The sector has been playing a key role as support to all other industries by supplying various types of machineries and spare parts, and also industrial units and capital machinery. They provide strong & vital support to other sectors of the economy.

Light Engineering Industries (LEIs) Sector constitutes a significant segment of the economy of Bangladesh in terms of their contribution to employment, output, value addition and exports. LE occupies a unique position in the economy of Bangladesh. They play a vital role in the socio-economic development of the country. The growth of the economy for alleviation of poverty and improvement of the well being of the people crucially depends on the development of the LEIs. Analysis shows that these small & medium scale industries have made substantial contribution to Gross Domestic Product (GDP) during the last few decades and created appreciable employment opportunities. These industries have potentials to make significant contribution towards technological and economic development along with wide opportunities for employment generation. LEIs are well known as labour-intensive industries. They require less capital and generate more employment per unit of capital. They are also important in training of labour and in the diffusion of technology. They also lead to spatial distribution of light engineering enterprises and help reduce pressure of population in big cities. But their survival and growth require an enabling policy environment and infrastructural support.

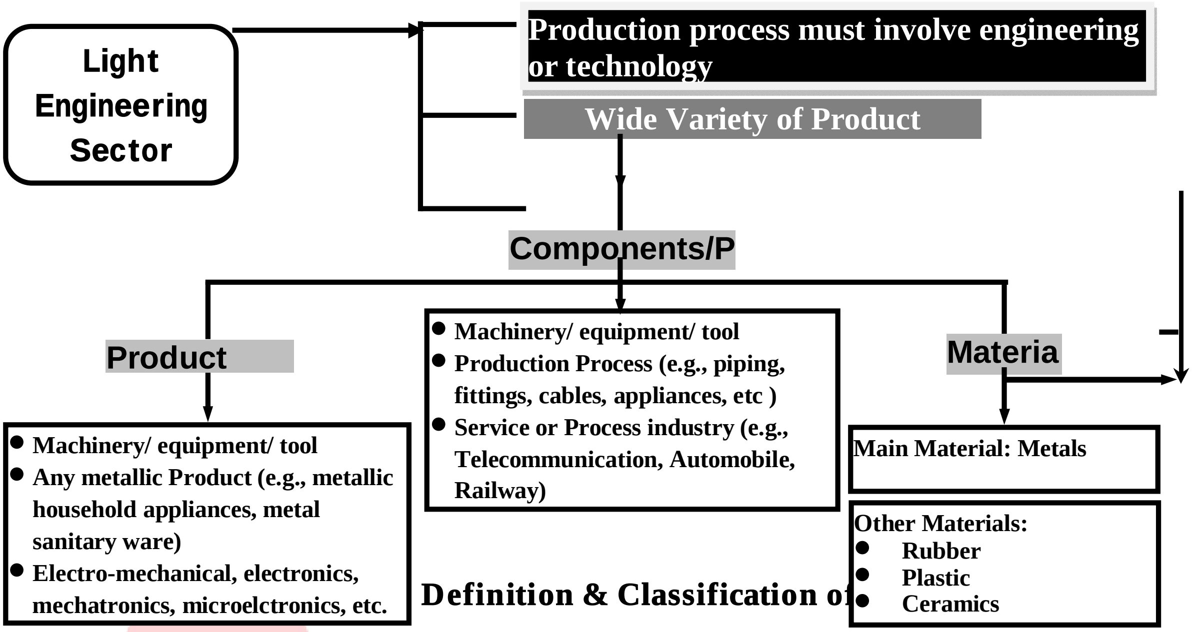
Bangladesh has got a fairly large industrial base. Most of these industries are still largely dependent on imports for machinery, equipments and spare parts. It is strongly believed by all quarters, both national and international, that Bangladesh can benefit a lot if the LE products currently imported by the major industries are manufactured within the country by extending necessary support to the Light Engineering Sector (LES).

These small industries are engaged in manufacturing various import-substitute products and thus saving valuable foreign currency. Manufacturing and processing activities in small and micro engineering enterprises contribute to the livelihood of huge number of poorest citizen. Viewing the employment potential, and its particular suitability for development, special emphasis should be placed in government policies to produce rapid growth in this sector. The LEIs depend less on imported inputs, can cater to both domestic and export markets and are better distributed regionally than larger firms. There are certain socio-economic advantages that the LEIs enjoy over the large-scale industrial units. The advantages are: lower capital investment, less hassle to get loan, lower job-creation cost, low risk factor, shorter start- up period, lower capital output ratio, less management problem, lower energy cost, moderate infrastructure requirement, promotion of entrepreneurial talents, more environment friendly production process, and promotion of agro - industrial linkages. These are also able to develop and function successfully in infrastructurally underdeveloped regions and markets. Moreover, these can help equitable distribution of the benefit of industrial development throughout the country. Because of large employment potential, less investment requirement and much suitability for uniform regional development, government policies always got special emphasis for rapid growth of this sector. In our country, as cost pertaining to labour and infrastructure, electricity, gas & water are cheaper than other countries, the production cost obviously can be competitive if management & other support services can be provided in an appropriate planned manner. It is evident that LEIs are vital element in the economic legacy of Bangladesh, and that there is much development potentiality in this sector especially to enter into the foreign markets.

1.2 Characteristic Features of LEIs in Bangladesh

1.2.1 Definition of LES

There is no universally accepted definition of LES. In Bangladesh LES consists of many engineering enterprises, a great majority of which are small in size. Enterprise development practitioners have defined as enterprises in LES are not large in size. Thus the first criterion for LES is that its consisting enterprises should be comparatively small in capital investment. Secondly, the production process must involve engineering or technology. Thirdly, the product variety encompasses metal products, and electrical, electronics and electromechanical products. Part of the manufacturing process or machine parts of LES may be made of ceramics, rubber or plastic. The following Figure 1 encapsulates the different aspects of LES.



1.2.2 Categories of LEIs

LES may be grouped under the following categories:

a) **Foundries:** Here cast metal products are produced. The items include volutes of irrigation pumps, iron parts of rice hullers, flour mills, etc. There are two types of foundry; one type uses iron and is called ferrous type foundries and the other type uses different non ferrous metals like aluminum, brass, lead, etc.

Foundry products include:

- Irrigation items: metal casing of pumps, liners for engines, different components of engines, pumps and power tillers, etc.
- Agricultural product processing equipment: rice hullers, oil expellers, paddy threshers, etc.
- Small spare parts for different engines including automobiles and different types of stop cock.

b) Machine shops: Machine shops use cast iron (foundry products) as basic materials and do the machining jobs. They produce finished form of all fabricated metal products. The product categories are the same as mentioned above under foundry shops.

c) Repair workshops: They do different types of repair jobs required by the agricultural, industrial or transport sector. They either directly contact clients to procure these jobs or receive job orders at their premises. They carry out the activities mostly by themselves. Only in some cases they have to go out for getting some jobs done in foundry or to other process facilitating units like electroplating, adding plastic components makers, etc.

1.2.3 Beneficiaries of LES Products

LEI known as the mother of heavy industries, is an important sector of the manufacturing sector. They support the industrial, agricultural and other sectors of the economy by manufacturing a wide range of spare parts, casting, moulds and dies, oil & gas pipeline fittings, light machinery, etc and by providing repair services. LES manufactures spare parts for cement factories, paper mills, jute mills, textile mills, sugar mills, food processing industry, plastic industry, printing industry, fertilizer factories, railway, shipping, marine transport, automobiles, construction machinery, and pharmaceutical industry, just to name a few. Undoubtedly, LES caters to the basic requirements of industrialization and plays a key role in keeping other industries running. The beneficiaries of LEIs products are shown in Figure 2.

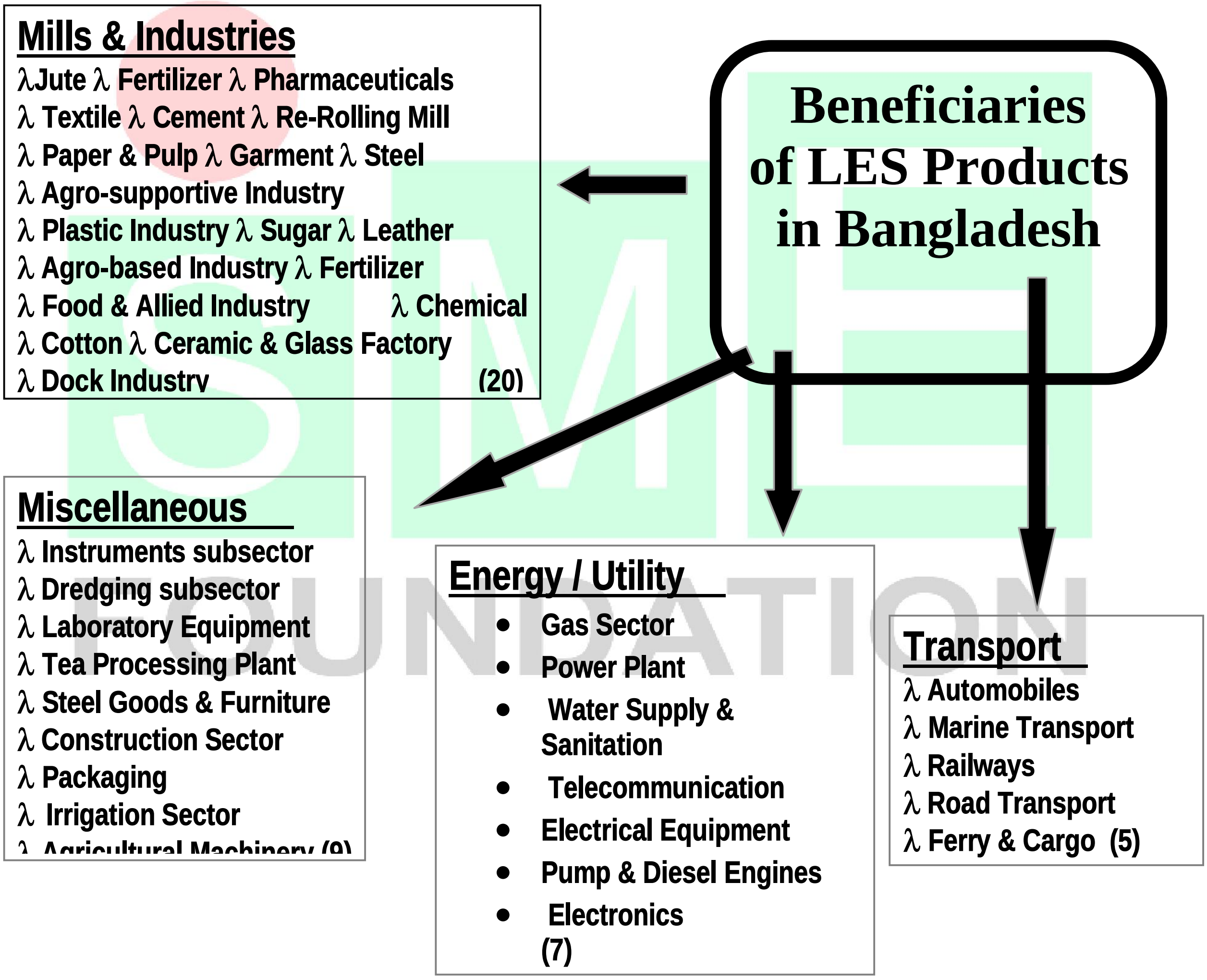


Figure 2: Beneficiaries of LES Products

1.2.4 Geographical Distribution of LEIs in Bangladesh

The geographical distribution of Light Engineering Industries in Bangladesh is shown in Figure 3.

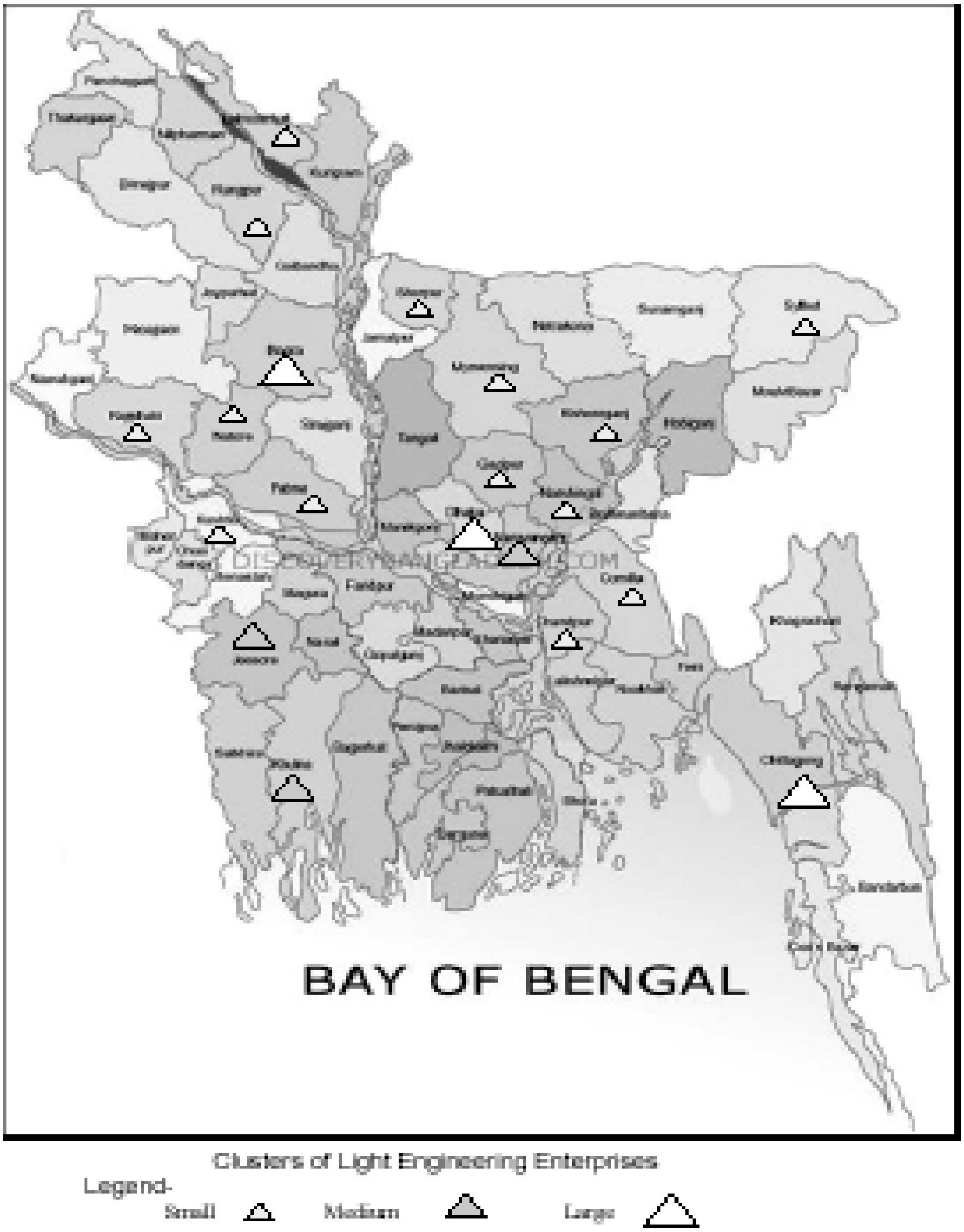


Figure 3: Geographical distribution of Light Engineering Industries in Bangladesh

1.2.5 Product Mapping of Light Engineering Industries in Bangladesh

Various products are produced by LES in different parts of the country Product Mapping of Light Engineering Industries in Bangladesh is depicted in Figure 4.

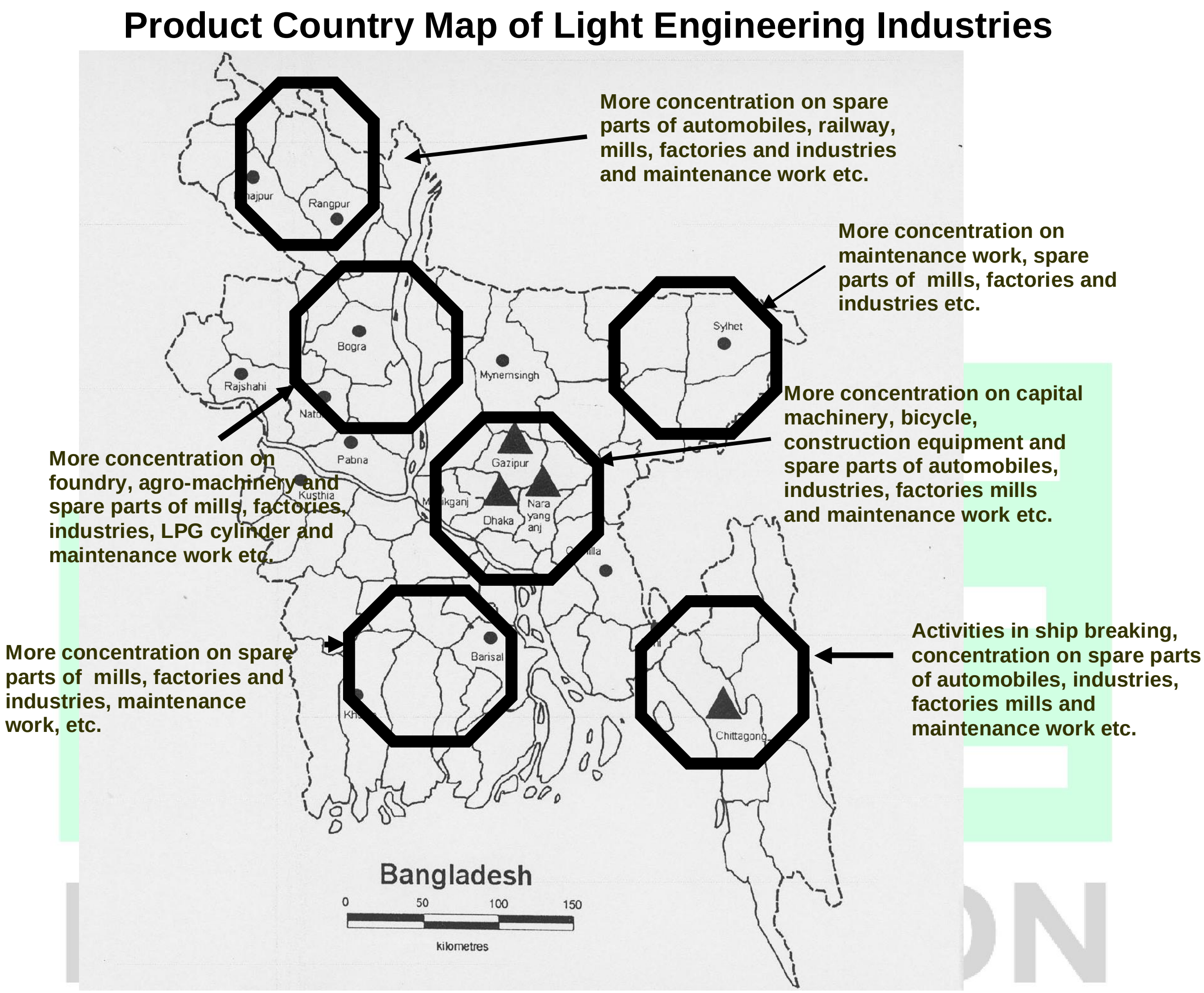


Figure 4: Product Mapping of Light Engineering Industries in Bangladesh

1.3 An Abridged View of Light Engineering Sector:

- Light Engineering Sector (LES) have emerged as the cornerstone of development providing the platform for industrial growth, enhancement of trade and economic prosperity. The light engineering industries have potency to play a significant role in technological and economical development along with a vast scope of employment generation.

- The Government of Bangladesh has declared the sector as a most priority sector in its Export Policy 2003 – 2006 and thrust sector in its Industry Policy - 2005.

- Light Engineering Sector is classified as a sub-sector of Small & Medium Enterprises (SMEs). An estimate shows that there are about 40,000 light engineering industries in the country. According to the estimate around 0.6 million semi-skilled, skilled and technically educated people and innovative entrepreneurs are actively engaged with the sector.

- In Bangladesh, over 90 percent of light engineering industries are serving the local needs of the people. There are strong backward and forward linkages between the light engineering industries and other sector (such as agriculture, automobile, and transportation) of the economy in Bangladesh.

- There are about 1200 light engineering industries presently enlisted in Bangladesh Small & Cottage Industries Corporation (BSCIC) who are supplying various products (such as spare parts, equipment, capital machinery) under sub contacting scheme.

- The product types of light engineering sector are: Automobile spare parts, Railway engine & rail line spare parts, Bicycle & cycle rickshaw, Machine tools, Jute & Textiles machines and spare parts, Chemical industries machines and spare parts, Sugar and food industries machines & spare parts, Engineering & metal industries spare parts, Ship industries spare parts, Agricultural machines accessories and spare parts. The light engineering industries of Bangladesh is currently producing more than 10000 types of quality machinery, spares and accessories.

- The consumer of light engineering products and services are both the public and private sector. Major public sector consumers are: Sugar and Food Industries Corporation, Bangladesh Chemical Industries Corporation, Bangladesh Railway, BRTA, BRTC, BIWTA, BIWTC, Port Authority, WASA, T & T, PDB, Public Health Engineering, Civil Aviation, Bangladesh Biman. The private sector is also the major consumer of the light engineering products.

- A number of potential export quality light engineering products are going to foreign market on direct and subcontracting means. These are spare parts of Paper & Cement mills, Bicycle, Fancy light fitting, Construction equipment, Battery, Voltage stabilizer, Iron chain, Cast iron articles, Carbon rod, Automobile spares, Electronics items, and Stainless steel wares.

- The infrastructure facilities (such as electricity, gas, transportation, and telecommunication) and labor cost are comparatively lesser than other countries as such the sector shows high potentiality of growth and development.

Chapter 7.2

Enterprise, Entrepreneur and Employees Profile of Light Engineering Industries

7.2.1 Introduction

Total 150 industries at different location of Bangladesh were surveyed (Table 1)

Table 1: Geographical distribution of sample establishments in the Light Engineering Industries, 2006/2007

	No. of establishment	Percentage of establishment
Dhaka	92	61.33
Gazipur	6	4
Narayangonj	10	6.67
Chittagong	30	20
Bogra	9	6
Jessore	3	2
All	150	100

Source: SMEF Survey, 2008

Table-2: Average employment per firm

Firm sizes	No. of firm	White color worker	Production worker	Others worker	All worker
Micro	38	0.66	3.92	0	4.58
Small	87	2.82	16.11	0.16	19.09
Medium	17	7.41	64.47	2.47	74.35
Large	8	7.75	188.13	1	196.88
Mismall	125	2.16	12.41	0.11	14.68
Melarge	25	7.52	104.04	2	113.56
All Firms	150	3.05	27.68	0.43	31.16

Source: SMEF Survey, 2008

Table- 3.: Average years of worker experience

Firm sizes	Average no. of male worker	Average no. of female worker	Average no. of all worker	Average experience of male worker	Average experience of female worker	Average experience of all worker
Micro	4.53	0	4.53	7.65	0	7.62
Small	16.05	3.02	19.07	7.10	0.81	6.82
Medium	64.35	10	74.35	7.48	0.76	7.01
Large	153	43.88	196.88	6.64	5.38	6.43
Mismall	12.54	2.10	14.65	7.27	0.56	7.06
Melarge	92.72	20.84	113.56	7.21	2.24	6.82
All Firms	25.91	5.23	31.13	7.26	0.84	7.02

Source: SMEF Survey, 2008

Scope and quality of entrepreneurial preparation of firm's creators

Successful company brands and the creation of brand loyalty typically call for entrepreneurial performance of a high caliber. According to Schumpeter, entrepreneurial performance is the defining characteristic of success in building an enterprise from the ground level up. What, however, is entrepreneurial performance, and how is one to best measure it?

Entrepreneurship is more than management, as the latter is popularly understood. Management is about managing inputs and processes, in their various aspects, that are prerequisite to satisfactorily producing the output of an establishment, based on a set of operating standards that have evolved over a period of time. Entrepreneurship is management, and then some. At times, the operating standards implicit in the routine operational procedures that amount to a best practice are bound to change suddenly and without notice for a manager/entrepreneur. A major buyer might for instance suddenly and without any notice slap upon the enterprise a binding unit price that is drastically lower. An important regional buyer has suddenly rejected a very large quantity of latest shipment of goods, causing a scramble at the headquarters of the exporter to find the root cause of the rejection. Received wisdom is of relatively little use during these periods when shocks---of one kind or the other---intervene. It is during these tumultuous times that the mettle---the entrepreneurial resilience--- of the enterprise is put to the test. How vigorously and how innovatively the enterprise will stage its response to the fuss at hand will typically depend upon how well-prepared as an entrepreneur. An entrepreneur is one who 'fills a gap' in the market-place, according to Leff (1968), thus dealing an effective solution to the absence of a complete set of markets---a frequent source of 'market failures' in economics. An entrepreneur is one who 'spots value in unlikely places and puts it to use to the point of improving his financial performance', thus hitting off with an effective improvisation I n a market for 'credence goods'[83]---a frequent source of 'market failures' in economics.[84] The question is this: what are the ideal measures of entrepreneurial preparation. We used three variables to measure entrepreneurial preparation: (i) number of years of formal schooling obtained by the entrepreneurs; (ii) whether the entrepreneur has acquired any specialized academic training that is directly connected with the running an enterprise in the industry in question; (iii) the 'degree of relevance' of the specialized training received by the entrepreneur. Tables 5 through 6 report the findings concerning the degree of the entrepreneurial preparation by the entrepreneur.

[83] Credence goods are characterized by unequal distribution of gainful information, setting buyers of goods apart from sellers, and giving rise to the problem of informational asymmetry (American Economic Review, 1994).

[84] David Morawetz, in a seminal review article, informed us of how a Japanese printing entrepreneur, while visiting with an US-based entrepreneur in the same industry, spotted a block printing machine lying discarded in the former's cellar, bought it and shipped it back home, to a better financial health of his enterprise. (The US proprietor had discarded the block printing machine because, at the then higher US wage rates, the labour productivity of the latter was not high enough. In Japan, the wages were still low enough to make the 'import' of the machine profitable). This action by the Japanese entrepreneur was an entrepreneurship *par excellence*.)

Table 4: Length of formal education, and the extent of the acquisition of specialized training in Light Engineering Industries surveyed

(Average values)

Firm size-classes	Ave. years since estd. was set up	Ave years of formal education by the entrepreneur			% With any specialized training	Ave. duration of such training
		Mean	Standard deviation	Coefficient of variation (%)		
Micro	16.32	6.95	4.61	0.66	2.0	
Small	19.34	5.33	5.43	1.09	7.3	
Medium	23.71	8.34	5.7	0.64	0.7	
Large	20.88	2.14	5.67	2.65	0	
Mismall	18.42	5.83	5.22	0.90	9.3	
Melarge	22.80	6.96	6.40	0.92	0.7	
All Firms	19.15	6.01	5.42	0.90	10.0	

Source: SMEF sample survey of the light engineeringindustry

Note: By specialized training, we mean particularized diplomas that upgrade specific vocational or industrial or technological skills in the trainees. For example, the questionnaire asked: "Did the Managing Director obtain a Masters or Diploma in Fashion Technology?"

The table shows that the average MiSmall establishment was born 18.4 years ago, while the corresponding average for the MeLarge establishment was 22.8 years. The difference is 23.8% staistically significant. The average light engineering establishment was born about 19.1 years ago. Secondly, the average educational attainment of MeLarge establishment (of 11.4 years of schooling) exceeds the corresponding attainment of the MiSmall establishment by about 19.4%, and this difference between the averages is statistically significant. Finally, only about 10% overall of the managing directors on the sample have had any exposure to specialized training.

Financing start-up capital involvement: magnitude, external and internal reliance

As said already, we follow the enterprises through their life-cycles even we launch into the narrative. That is to say, we start now with the economic circumstances of their mobilization of the start-up head-count, scale of operations and, more to the point, the manner in which they had mobilized their start-up capital. The results relating to these aspects of the narrative are presented in table-7 and 8 below.

Table-5: Start-up economic circumstances of the sample establishments in the Light Engineering Industries

Firm-size	Strength at start-up (Number)		Total start-up financial capital mobilized(Taka Thousand)			
	employees	machines	Equity/ Retained earning	Bank loans	Informal loans	Equity-Debt ratio
Micro	1.97	1.95	144	7.89	28.89	3.92
Small	6	3.27	851.34	5.98	31.17	22.92
Medium	14.53	4.59	912.94	58.82	188.24	3.70
Large	66	23.13	394.8	275	175	0.88
MiSmall	4.78	2.82	636.34	6.65	30.48	17.14

Firm-size	Strength at start-up (Number)		Total start-up financial capital mobilized(Taka Thousand)			
	employees	machines	Equity/ Retained earning	Bank loans	Informal loans	Equity-Debt ratio
MeLarge	31	10.52	747.2	128	26	4.85
All	9.15	4.11	654.81	26.80	56.07	7.90

Source: SMEF Survey, 2008

Table-6: Firms who did not take any loan at the time of start-up

Firm size classes	No. of firms	No.of no debt firms	% of no debt firms
Micro	38	27	71.05
Small	87	66	75.86
Medium	17	8	47.05
Large	8	7	87.5
MiSmall	125	93	74.4
MeLarge	25	15	60
Total	150		

Source: SMEF Survey, 2008

The table shows that while the MiSmall establishments in the Light Engineering Sector report an average start-up headcount of 4.8 in the start-up year, the corresponding headcount for the MeLarge establishments in this Light Engineering Sector happens to be 31. Whereas the representative MiSmall establishment in the Light Engineering industry reports an average number of machines of 2.8, the corresponding number for the MeLarge establishments in this sector happens to be 10.5. Likewise, whereas the representative MiSmall establishment in this industry report an average start-up equity of Tk. 636 thousands, the corresponding equity for the MeLarge establishments in this sector happens to Tk. 747 thousands.[85], [86] Likewise, whereas the representative MiSmall establishment in this industry report an average start-up debt of Tk. 37 thousand, the corresponding debt for the MeLarge establishments in this sector happens to Tk. 154 thousands. On an average, the equity-debt ratio at start-up of the four categories of firms in the Light Engineering Sector is found to be 3.92, 22.92, 3.7 and 0.88.

Equity including retained earning happens to be source of start-up capital of choice among the entrepreneurs in this industry. Use of, or access to debt, seems, strictly, to be a minority in this industry. This picture is seen in Table 8. In general, it can be seen that the light engineering industries are very shy to get into the borrowing capital. A trend can be noticed that in MeLarge group, higher the size of the firm, the lesser is the tendency of availing the debt. This reliance on equity including retained earning especially by the micro, small and medium establishments in this industry as shown above also happens to be the general characteristic of the small and medium enterprises in Bangladesh in the general case as well.

Principal products and bye-products

[85] Equity in our formulation includes retained earnings, including from other businesses wholly or partially owned by the entrepreneur in question.

[86] The establishments whether within the MiSmall or MeLarge categories start up in different years. Strictly speaking, it is not legitimate to group for purposes of calculating an average for them. That said, one of the reasons why we still group them is that we want to calculate how much of growth the establishments have had since their start-up. We group them once again for purposes of calculating an average level of equity they have in the study year, namely, 2006-2007.

Table-9 is about the relative prominence of establishments with different business models, and about the number of main products which are produced by the establishments. As well, we distinguish between two major categories of establishments, namely, (i) those who rely solely on *own-account production*, and (ii) those who rely solely on *contract manufacturing*.

Business model differences: own-account producers *versus* contract manufacturers

We mainly recognize two business models, namely, own-account producers, contract-manufacturers and others. Own-account producers are those who implement each of the stages of the life-cycle of being a manufacturer: designing products, calculating addressable markets and the size of production batches, buying raw materials, accessing finance, setting the price, and being responsible for marketing what is produced. If (s)he can do all of the above efficiently, minimizing his costs and maximizing his sales, (s)he will be in the black, and make money. The distinguishing characteristic of this business model is that the entrepreneur takes all the risks and pockets all the difference between the revenue and his costs. By comparison, contract manufacturing is a competing business model in which the manufacturer essentially works as an agent of a third party. The latter issues to the former the specifications of the products and the quality standards (e.g., the percentage of rejects in the output consistent with satisfactory delivery, etc.), and pays him a manufacturing charge for what (s)he manufactures: the CM has to buy up the needed supplies of raw materials and accessories. A variation on the above theme is that the third party procures the essential raw materials and supplies them to the contract manufacturers' (CM's) premises, and agrees to buy up to an agreed overall quantity subject to the CM passes muster in terms of the quality standards. In this case, of course the third party sets a different, and lower, price. But even so, the CM does not have to worry about buying supplies and taking the risks of marketing the product. The acid test of profitability for the CM is only that he correctly works out whether his unit cost of manufacturing subject to the third party's leaves him a positive margin of cash-gains. Besides these two dominant types, there is the largely residual, 'third', type we call 'others'. This type comprises of establishments with dual-mode business models, such as when an own-account producer doubles up as a part-time trader of items similar to those that he also manufactures.

Table-7: Differences in specialization: own-account production versus contract manufacturing in Light Engineering Sector, 2007

Firm size classes	Proportion of units that are in engaged in (in percent)				No. of products and bye-products	
	Own-account production	Contract manufac-ture	Others	All establishments	Average no. of main products produced	Average no. of bye-products
Micro	16.67	8.67	0	25.34	1.55	0
Small	24	32.67	1.33	58	1.57	0
Medium	7.33	4	0	11.33	1.88	0
Large	2	3.33	0	5.33	1.63	0
MiSmall	40.67	41.33	1.33	83.33	1.57	0
MeLarge	9.33	7.33	0	16.66	1.8	0
All firms	50	48.67	1.33	100	1.61	0

Source: SMEF Survey, 2008

The Table 9 informs us that contract manufacturing and out-sourcing comprise the single most important type of business models prevalent in the Light Engineering industry of Bangladesh. A clean 48.7% of all the establishments on our sample are found to be based on this model, whereas another 50%, overall, of the establishments are found to be working per the own-account production model. Close to 1.3% of the sample establishments belong in the 'other' type. Secondly, we note that while the MiSmall establishments are significantly higher distant (difference of 34%) from the MeLarge establishments in terms of the respective proportions of CMs in their total numbers, there is a difference of more than 31% points between the two classes of establishments when it comes to the percentage of own-account producers, with the the higher value being with the MiSmall establishments. The last column informs us that the average number of products manufactured by the establishments in the size-classes (ie, micro, small, medium and large) is 1.61.

Sectors Served by LES Sector are as follows.

1. Automobile
2. Railway
3. Bicycle and Rickshaw
4. Machine Tools
5. Jute & Textile
6. Chemical Industries
7. Sugar and Food Industries
8. Pharmaceutical Industries
9. Engineering and Metal Industries
10. Ship Industries
11. Agricultural sector
12. Oil and Gas line fittings
13. Electrical
14. Electronics
15. Telecommunication

Some of LES Producers produce complete machinery along with spare parts particularly for Jute & Textile, Chemical Industries, Sugar and Food Industries and Pharmaceutical Industries.

Table-10 reports scale of output per establishment and the value of gross output of the sample establishments arrayed in order of their size, ranging from micro to large sizes. At this stage, it will only be in order to take cognizance of the mosaic represented by the results about the various average based on various ways of slicing and dicing the data. We should probably not wish to find well-defined patterns in the results. Several findings each rate a citation.

First, for OAPs, physical output per establishment for the MiSmall and MeLarge establishments are, respectively, 34.82 and 274.44. For all OAPs, the physical output per establishment is found to be 79.55 unit. By comparison, the average scales of output for the CMs are typically higher, sometimes significantly higher. Thus, output per establishment for the MiSmall and MeLarge CM establishments are, respectively, 77.25 and 232.01 units. Both sets of mean differences setting MiSmall apart from MeLarge establishments are statistically significant. Secondly, average gross output per establishment for the MeLarge class for the OAPs is Tk. 94951.07 thousands compared with Tk. 6898.16 for the MiSmall class---in other words, is more than 13.76 times as large.

The average scale of output per establishments for the CMs of the MeLarge class, at 232.01 units, is more than three times as large compared with the MiSmall establishments. Average gross output per establishment for the MeLarge class for the CMs is Tk. 67114.6 thousands compared with Tk. 23018.1 for the MiSmall class---in other words, is more than 2.92 times as large. The upshot is that average unit-values[87] of the products of the MiSmall category of establishments are significantly lower compared with MeLarge establishments.

Table 8: Differences in scales of output between own-account production versus contract manufacturing in Light Engineering Industries, 2007

Firm size classes	Average scale of output per unit engaged in physical units			Gross value of output per establishment (Tk 000s)		
	Own-account production	Contract manufac-ture	Others	Own account producers	Contract manufacturers	Others
Micro	3.93	5.94	0	3231.06	1852.52	0
Small	56.27	96.17	14.69	9444.75	28633.4	3690
Medium	198.64	181.51	0	35374.5	46033.4	0
Large	552.38	292.61	0	287000	92412	0
MiSmall	34.82	77.25	14.69	6898.16	23018.1	3690
MeLarge	274.44	232.01	0	94951.07	67114.6	0
All firms	79.55	100.57	14.69	23564.79	29662.8	3690

Source: Six Sector Studies Survey, 2006/07

Table 9: Average gross value added by different types of establishments, 2006/2007

Firm size classes	Gross value added per unit (Tk. 000s)			
	Own-account production	Contract manufacture	Others	All
Micro	2110.309	652.95	0	1611.74
Small	5522.58	8283.71	2292	7003.43
Medium	11133.09	25179.9	0	16090.8
MiSmall	4124.11	6683.72	2292	5364.36
All firms	9333.206	9023.4	2292	9088.55

The gross value added as percentage of gross value of output, is shown in Figure 12. The ratio is in the same order for OAPs and CMs in the case of MeLarge. While for MiSmall, the ratio for OAPs is about double than CMs.

Source: SMEF Survey, 2008

[87] For uni-product establishments, average price of product is a clear cut concept: this relates to what on average has the product of the establishment sold for. Matter are much less clear-cut when firms typically produce or custom-make between three and four different products, each replete with its own unit of measurement, level of technological complexity, the end-user it is supposed to cater to, and the input-intensities that characterize them. Here, unit values of different product will differ. Typically, different products will be 'chained' including by using a kind of method that we used, meaning one method that is based on using price relatives for the different products and thus 'converting' quantities of each of the 'comparator' products into units of a 'benchmark' or 'dominant' product segment. In this case, we get what we call average unit values across all different physical outputs of the establishments in question. That is why we are using the term average unit values.

Table 10: Gross value added as percentage of gross value of output, 2006/2007

Firm size classes	Gross value added relative to Value of gross output, per establishment, across three types of establishments			
	Own-account producers	Contract manufacturers	Others	All
Micro	65.31	35.25	0	58.40
Small	58.47	28.93	62.11	34.80
Medium	31.47	54.69	0	36.74
Large	37.86	20.18	0	31.03
MiSmall	59.79	29.04	62.11	36.14
MeLarge	33.73	33.09	0	32.92
All firms	39.61	30.42	62.11	33.89

Source: SMEF Survey, 2008

The Accuracy of Results from the surveys conducted for six sector studies

The objective of this subsection is to demonstrate, if only in passing, how the cryatallization of a knowledge base can enhance the exercise of policy-making. We first show some important results relating to micro, small, medium and large establishments are presented in the following tables (13 and 14), based on data generated by two large-scale sample surveys of the SME sector carried out in Bangladesh during the last six years or so. The first source is the World Bank's Investment Climate Survey 2002. The second source is the in-depth surveys associated with six sectors, commissioned by the SME Foundation in 2008.[88] Results from the two surveys are presented having the same format, in the interest of ready comparability. We then include some diagnostic results from a stochastic frontier production function for highlighting how certain behavioural variables, measured at firm level, can explain firms' distance from estimated efficiency or production frontiers (Table 2.3). We include these results because we also wish to be able to do similar econometrically appropriate diagnostic analyses with the data that this implementation would enable one to generate.

Table-11: Economic characteristics of micro, small, medium and large firms, 2002

(Unless otherwise indicated, financial values are in Tk. 000s)

Particulars	Micro	Small	MiSmall	Medium	Large
Sample size	34	195	229	127	621
Total sales	22177	28012.2	27145	75000.2	289013
Direct material cost	13033	18631.5	17800	51393.7	152994
Value added	9144	9380.6	9345	23606.4	136019
No. of workers	5.47	28.27	24.89	68.4	415.2
Labour productivity	1671.6	168.8	375.45	345.12	327.6
Capital employed	11879.8	25078	23118.6	120930	250283
Capital-output ratio	1.29	2.67	2.47	5.122	1.84
Capital productivity	0.78	0.37	0.40	0.19	0.54

Note: Sample size of the source is 977 establishments interviewed by Bangladesh Enterprise Institute (BEI) in 2002.

Source: Investment Climate Survey (ICS) data, 2002

Table 12: Results from the six sector studies surveys commissioned by the SME Foundation

(All numbers, unless said to the contrary, are measured in Tk. 000s)

	Micro	Small	Medium	Large	MiSmall	MeLarge	All
Sample size	121	465	170	89	586	259	845
Total sales	4978.471	25837.37	88239.79	443107.8	21530.34	210216.8	79438.4
Direct material cost	2794.63	17636.41	51870.7	229761.1+	14571.79	113033.0	44825.1
Value added	2183.84	8200.96	36369.08	213346.7	6958.549	97183.78	34613.3
No. of workers	5.485124	22.78899	68.58559	406.3703	19.21679	184.882	86.87925
Labour productivity	398.1386	359.865	530.2729	525.0057	362.1077	525.6529	398.407
Capital employed	2513.603	6734.928	87261.29	159273.7	10061.26	112006.9	45806.42
Capital-output ratio	1.63836	0.703183	1.563648	0.708212	0.887852	1.234108	1.054995
Capital productivity	0.61	1.42	0.64	1.41	1.13	0.81	0.95

Source: SMEF Survey, 2008

Note: These are results compiled from six reports recently prepared for the SME Foundation. The International Economic Statistician/Team Leader of the present Maxwell Stamp Limited team was also the Team Leader of the said SME Foundation. Between the six sectors, 846 manufacturing establishments were surveyed and interviewed in very considerable depth. The sectors are (a) agro & food processing; (b) light engineeringindustry; (c) electricals and electronics; (d) leather & footwear; (e) light engineering and (f) plastics. The averages are all weighted averages.

Several similarities between the two sets of results are notable, as follows:

(1) Value added as a percentage of sales for the MiSmall class of establishments is found to be 31.5%. For the ICS-2002, this is found to be 34.4%. Considering that Bangladesh economy has become even more outward-oriented during the six intervening years since 2002, thereby increasing competitive pressure on the domestic manufacturers. That assessment is consistent with the take of value added's relative share in sales having fallen between 2002 and 2007. In contrast, for the large enterprises, value added relative to sales is found to have risen between 2002 and 2007---from 47.1% to 47.8. Even so, the percentages yielded by the two surveys are strikingly similar. The point is that both survey samples seem to have been drawn from the same universe.

(2) Labor productivity (in thousand Taka worth of value added per worker employed) is found to be Tk. 375.45 thousands in 2002 as compared with Tk. 359.9 thousands in 2006/7. That is a striking similarity. Value added per worker is one of the most central empirical metrics when it comes to pro-poor development.

(3) Both surveys show that the MiSmall establishments register significantly higher capital productivity---by returning lower or much lower capital-output ratios on an average compared with medium or large firms.

It is reassuring that the more recent 2006/2007 survey, which has a somewhat smaller sample size than the ICS-2002, yields results that are often very similar compared with the latter. This is because, on a close examination, it was found that there is a close correspondence, for example, between the average enterprise employment size across the firm-size structure reported by the BEI survey, compared with the findings from the Economic Census, 2001/2003, conducted by the Bangladesh Bureau of Statistics (BBS). BBS reported an average employment size of 66.7 in 2001/2003 for medium enterprises, whereas the ICS data put that average at 68.4--- a statistically insignificant difference indeed (Chowdhury, 2007b). The BBS reported an average employment size of 389 in 2001/2003 for large enterprises, whereas the ICS data put that average at 415--- a difference of 4 or 5 percent, which is small. The quality of data in the 2006/2007 surveys of the six sectors appears to be representative of the same 'universe' as the ICS-2002.

The grossed up value of gross output and grossed up value of value added in the sector is shown in Table 15 (a). For small enterprises, average value of gross output per establishment is Tk. 20.121 billion where as average value of value added per establishment Tk. 7.003 billion and grossed up values are Tk. 22755.61 billion and Tk. 7920.88 billion respectively.

Table-13: Differences in gross value added between own-account production versus contract manufacturing in 2007

Firm size classes	Gross value added per unit (Tk. 000s)				Number of establishments in Bangladesh (No)	Grossed up value of gross output (Tk. million)	Grossed up value of value added ((Tk. million))
	Own-account production	Contract manufacture	Others	All			
Micro	2110.309	652.95	0	1611.7	9310	25689.99	15,005.30
Small	5522.58	8283.71	2292	7003.43	1131	22755.61	7,920.88
Medium	11133.09	25179.9	0	16090.8	119	5211.61	1,914.81
Large	108652	18647.7	0	52399.3	97	16378.45	5,082.73
All firms	9333.206	9023.4	2292	9088.55	10657	36116.90	29,923.73

Source: Six Sector Studies Survey, 2006/07

Raw Materials Used in LES

A wide range of raw materials and inputs are used by the engineering industries in Bangladesh. It is seen in Table 5.2 that the sources of metallic raw materials (both ferrous and non-ferrous) are: import, ship breaking scrap and local scrap. Among these, ship breaking scrap is the important source particularly for the light engineering industries. Ship breaking scrap industry (located in Chittagong) is also an important source of different used machines, both electrical and non-electrical, and instrument. The importers of raw materials are mostly based in Dhaka and Chittagong.

Table 14 Major raw materials used in engineering sector

Raw Material/Input			Source
Materials	**Metals and Alloys**		
	Ferrous	**Steel**	**- Local steel mills/re-rolling mills - Ship Breaking Scrap - Import**
		Steel scrap	**- Import - Ship Breaking Scrap - Local scrap**
		Pig iron/cast iron	**- Import - Local scrap**
		Ferroalloys	**- Import**

Raw Material/Input			Source
	Non-Ferrous	Copper, aluminium, tin, nickel, lead, zinc etc.	- Import - Ship breaking scrap - Local scrap
	Polymer/resin		- Mainly import -Local scrap
	Non-metallic mineral based raw materials		- Mainly import - Local
Machines and machine tools			- Import (new and reconditioned) - Shipbreaking - Locally made
Tools			- Mainly import - Local
Electrical machines			- Import (new and reconditioned) - Shipbreaking - Locally made
Instruments, testing equipment etc.			- Import (new and reconditioned) - Shipbreaking - Locally made
Chemicals and paints			- Mainly import - Local
Welding electrodes			- Mainly local - Import
Industrial gases	Compressed air, oxygen, nitrogen argon		- local - Import
Solid and liquid fuel	Coke Coal Diesel Furnace oil		- Import - Import (local in near future) - Import - Import
Natural gas			- Local
Electricity			- Local
Packaging/Printing			- Local

Source: SMEF Survey, 2008

Polymers/resins are imported raw materials. Machinery is mainly imported. But in some industries, locally produced machines are also being used. Chemicals are mainly imported. Some companies also use locally produced chemicals (e.g., sulphuric acid, ferrous sulphate etc.). Industrial gases except argon are local. Solid and liquid fuels are imported. But it is expected that local coal will be available in 2004 from the Barapukuria coal mine.

Chapter 3

Enterprise-Cum-Entrepreneurial Development Profile of Light Engineering Industries

3.1 Introduction

By incumbents, we mean prominent leaders of the industry in question. That said, however, the Team had proposed that only about 12 or so large establishments in the Light Engineering Industry would be surveyed. (And the SMEF had concurred with this proposal.) The presentation of the incumbents in the following would therefore be confined to five or six among the most prominent of the establishments surveyed, including several of the largest of the establishments surveyed. The presentation would largely be cast in terms of the business development capabilities of these incumbents. We shall single out only one business development capability. That capability essentially comes in essentially three flavours. First is the development capability of ensuring growth of the employment size. The second is the development capability of ensuring growth of retained earning. The third is the development of capability of ensuring growth of sales. With this in mind, we present five case studies of entrepreneurial 'movers-and-shakers' of the Light Engineering Sector of Bangladesh.[89]

3.2 Enterprise Specific Observation

The team has studied one hundred and fifty (150) light engineering industries ranging from tiny to large size units producing different types of products. It is considered appropriate to make critical observations about the enterprises under a common framework. All the enterprise have the following four components for their existence and substantial operation.

- Technoware (Physical facilities)
- Humanware (People to manage and operate the facilities)
- Inforware (Information necessary for systematic operation)
- Orgaware (Organizational setup to perform the activities)

The level of sophistication of the four components (T-H-I-O) varied widely in the surveyed industries. Technowares or the technologies are the key elements of the Engineering Industries. Technologies related to LEIs can be classified under two sub-groups namely product technology and production technology (Table 7.1). Both types of technology can be graded as conventional, semi-modern and modern. In the technology upgradation process, conventional technology is substituted by semi-modern and modern technology. In a developing country like Bangladesh, one may observe the existence of all the three grades of technologies both at product and production level.

[89] It is in the best tradition of empirical research that these profiles will be anonymous, and that no names will be named. The names of the entrepreneurs to be used will be fictitious. And, yet we want to confirm that each of these five case studies are the whole truth, and nothing but the truth.

Table 15: A Model for Capability Assessment of an Industry: Assessment Indices

Grading	Technology		Humanware		Infoware		Orgaware
	Product Technology	Production Technology	Entrepreneur	Employees	Business Information	Technical Information	
First Grade	Modern	Modern	Excellent	Excellent	Excellent	Excellent	formal
Second Grade	Semi-Modern	Semi-Modern	Good	Good	Good	Good	Transitional
Third Grade	Conventional	Conventional	Reasonable/ Average	Average	Average	Weak	Informal

Source: SMEF Survey, 2008

Human capability embodied in the enterprises can be adjudged with reference to two groups of people namely entrepreneurs and employees. The capabilities of the entrepreneurs can be graded as average, reasonable, good and excellent. Entrepreneurs having innovative aptitude, moderate business skill, limited management capability and low technical knowledge can be termed as reasonable. Entrepreneurs having innovative aptitude, good business skill, good management capability and low technical knowledge can be termed as good. Entrepreneurs having innovative aptitude, good business skill, excellent management capability and sound technical knowledge can be termed as excellent. Technical people attaining their skills through on the job training can be graded as average. Technical people having appropriate formal education and some experience can be graded as good. Technical people having necessary education and adequate experience can be graded as excellent.

The type of information needed by the enterprises can be grouped as business information and technical information. The quality of business information can be graded as average, good and excellent. The quality of technical information can be graded as weak, good and excellent.
The status of organizational system of the enterprises has been classified as informal, transitional and formal. Under informal organizational set up the entrepreneur himself tends to carry out all the major activities. Whereas under formal globalization set up responsibility to of the activities are divided according to functional lines. Transitional type of organization falls in between the two.

Case 1: From a small merchandiser to a leading foundry man

The first case study in light engineering sector pertains to the industrial production unit of Zaket Engineering Associates Ltd. (ZEAL) which is located at 86-87 Postagola, New Industrial Area, Dhaka-1000 and the sales outlet and office is located at 26 Madan Paul Lane, Nawabpur, Dhaka-1204. Mr. Jahangir Khan is the owner of Zaker Engineering Associates Ltd., (ZEAL).

Mr. Jahangir Khan passed .Secondary School Certificate (SSC) examination in 1970 from Gandaria High School. He started studying in HSC class at Sohrawardy College (night section). During day time he used to work in his uncle's shop with a salary of Tk. 100 per month. In 1971 he joined liberation war. In 1972 he rejoined to his uncle's industry fabricating filters for tube wells with a salary of Tk. 300 per month. In 1973, his uncle made him a partner of the factory. He used to get monthly salary and share of cash-gain as partner. He opened a new shop (Progati Filter and Iron Industries). He made his younger brother as a business partner. He used to import sanitary goods for his shop. In 1977, he started Cinema hall business at Tangail. In 1982, he initiated filter industry along with trading with cinema spare parts and cinema film rental business. In 1983, he initiated diesel engine spare parts business. In 1985, he opened diesel engine spare parts shop of his own named Zaker Machinery Store at Madan Paul Iane, Nawabpur. He used to import machinery and equipment from different countries such as Germany, India and UK.

In 1990, Mr. Khan started his own workshop, Zaker Engineering Associates Ltd. with 4 numbers of second hand lathe machines and some drilling machines. He himself did not work as a machine-man but employed technicians to work for him. He used to think that something big is to be established.

In 1990, he observed Industrial Plots at Postagola and decided to buy a 10 Katha plot with 12 lakh taka. In 1994, he applied for Bank loan of Tk. 10 million to establish an industry on his own plot at Postagola with 35:65 equity and loan. His business experience helped him to make the industry. For importing spare parts he used to visit India almost every three months. He .assessed business opportunities during his visits to India.

Manufacturing of steel by using induction furnace drew his attention. His loan was sanctioned in 1995 and he constructed the factory building in 1995. He selected the factory machines from his own experience and one of his friends also helped him. He bought a two Special Purpose Lathe Machines (SPLM) at a cost of US$ 50,000/- each from Rajcoat, Gujrat and Agra, U.P; Induction, Furnace from Delhi at a cost of US$ 100,00/-. The capacities of the Induction furnaces were 1 x 1000 kg and 2x300 kg. Induction Furnaces were brought to factory site via Delhi/Chittagong/Dhaka (by truck from Inland Container Depot at Dhaka). Other machinery were brought to the factory site directly by truck via Benapole. He made the installation of the machines by himself on the basis of his own experience. He received electricity supply in February 1999 long after installation of the induction furnaces.

His small workshop established in 1990s helped him to identify markets and gradually develop the market over the years for the product produced by the present unit. He shifted his factory to Postagola factory site with his old machines in 1995. He started operating the machines with sanctioned electricity load of 20 kWh. His present Sanctioned electricity load is 450 kWh. He reported that in July 2001, his factory has been running at 50'% capacity. With the sanctioned load he can either operates 1000 kg furnace or 2x200 kg furnace along with workshop machines. He cannot operate all the furnaces at a time with the sanctioned electricity load. Depending upon the order of spare parts he either operates the1000 kg furnace or the smaller furnaces. He has a 5 ton capacity cupola furnace for casting. He can cast Aluminium, Stainless Steel and various type of Cast Iron. He works on order received via middle-man. He could not yet establish direct contact with all the industries using the spare parts.

ZEAL can manufacture a wide range of steel, alloy steel and other casting ranging from 0.25 kg to 1300 kg individual weight as per composition and demand of customer. So far products have been manufactured and/or has the capacity to manufacture of the following industries: Railway, Cement Plants, Fertilizer Industries, Steel Plants, Roads and Highways, Tea Industries, Sea Ports, Sugar Industries, Leather Industries, Plastic Industries, Textile Industries, Defence, Automobiles, Thermal Power Plant, Chemical Industries, Paper and Pulp Industries, Ship Building, Dock Yards, Dredger Organization, Ceramic Industries, Engineering Industries. ZEAL has published a brochure to communicate with the prospective customers different products it can produce. Products of different types of materials produced by ZEAL have been reported as follows.

(1) Various Grades of Stainless Steel;
(2) High Nickel High Chromium Corrosion Resistant Steel;
(3) Various Grades of Heat Resistant Steel;
(4) High Cat.bon-High Chromium *Wear* Resistant Iron;
(5) Spheroid Graphite Iron;
(6) Silico Manganese Steel;
(7) Carbon Steel with Low, Medium and High Carbon Contents;
(8) Low and high Alloy Steel with various elements like chromium, nickel, molybdenum, vanadium, tungsten, cobalt, boron etc.
(9) High manganese wear resistant steel with Mn content of 12-140/0;
(10) Various grades to Tool and Die Steel for Cold and I lot Working

There are good market demands of his products.

Observations on Factory Visit

ZEAL has the following three production units (a) One Cupola Furnace to carry out ordinary casting; (b) three Induction Furnaces for casting Alloy Steels; (c) a workshop to fabricate piston liners, pistons and piston rings. Mr Khan has installed the following machinery in his fabrication workshop: Special Purpose Lathe Machines (SPLM), General Purpose Lathe Machines (GPLM), Different Type of Boring Machines, Different Type of Grinding Machines, Ring Cutting and Ring Grooving Machines. When they need the service of other type of workshop machines, they use the facility of other workshops on sub-contract basis. The main purpose of using the workshop unit has been to use the capacity of the casting units. Mr. Khan also tries to sell the excess capacity of the two casting units on subcontract basis. Mr. Khan reported that in the whole country there are about 100 casting units located in Dhaka and Bogra producing similar products like ZEAL. There are problems in marketing. Sometimes, it is necessary to sell the products on credit. If one product earns good name in the market, everybody try to produce and market the same product without care for the quality. Sometimes, large importers also import and market similar products. There are competitions from local as well as imported products. There is a cost to advertise the product to increase sale. Advertisement draws the attention of the competitors to produce the same product by imitation. It has a cost to challenge the imitators legally.

Mr. Khan participated in the Reverse Engineering Course organized by the Institute of Appropriate Technology (IAT) from 18-22 May, 2001. The experience of the course has been useful to understand his business operation from wider perspectives. Previously he didn't attend any other training programme or course. In connection with business, most of his visits to foreign countries were limited to India. Twice he had been to England for social cum business purpose in 1994 and in 2001.

Mr. Khan has engaged an Indian technician to supervise the operation of the Induction Furnaces. The Indian technician has been engaged for 18 months. Already he has worked for six months but Mr. Khan could not engage an appropriate counter part local technician to assimilate and transfer the technology. There are no pyrometers in the factory to measure the temperature of the furnaces. An experienced technician (melter) working in the industry reported that he can guesstimate the temperature of molten metal by eye estimation. During his previous employment (1988-89) in a similar unit located at Savar, he had the opportunity to undertake on the job training at Delhi (in Golden Sun Industry) and at Calcutta (in Dilip Industries Corporation), where he learnt to compute the amount of different chemicals to be added with steel to make alloy of certain composition and how to measure temperature of molten metal.

Total 48 persons have been working in the factory. Most of the workers had primary level education, then had practical work experience. They work one shift a day from 9 AM to 6 PM and are paid on monthly basis. In certain cases, their base level salary is indexed to minimum piece rate of production per day. One of Mr. Khan relative works as factory manager. Mr. Khan is a member of Executive Committee of Engineering Industries Owners Association (Engineering Malik Samity).

Price of different type of inputs for the factory were reported as follows: Scrap iron Tk. 11-Tk. 12/kg, pig iron Tk. 13.50/kg, hard coke Tk. 12-Tk. 12.50/kg, ferro-silica Tk. 50/kg, ferro-managese Tk. 45/kg, Aluminium Tk. 80- Tk. 84/-/kg, aluminum ingot Tk. 120-Tk. 130/kg, Chromium Tk. 470/kg, titanium Tk. 300- Tk.400/kg.

During visit to the factory, it was possible to meet Mr. Nimai Chandra Kundu, a Mechanical Engineering graduate from BUET. Mr. Kundu invests his experience and expertise in ZEAL as a sub-contractor. After graduation from BUET in 1992, Mr. Kundu joined in a Alloy Steel making factory at Savar and worked for six years. While working in that industry he learned steelmaking process and also got the opportunity to identify different users of steel and their product need. After leaving that industry, Mr. Kundu is now engaged in marketing of standard alloy steel products to different industries. He has established very good contact with different departments of Bangladesh University of Engineering and Technology to test the quality of the products needed by the clients. Mr. Khan could not acquire this expertise because he has not been familiar with BUET test facilities. Mr. Khan's participation in Reverse Engineering course will facilitate to use BUET test facilities by paying necessary test fees. Mr. Kundu receives contracts from the industries requiring spares and then comes to ZEAL and produce quality products by using the ZEAL facilities by paying an agreed weight rate for the fabricated product. Mr. Kundu reported that he maintains similar relations with other alloy making industries similar to ZEAL. On an average, he uses the test facilities of Metallurgy and Materials Department of BUET twice a month. Mr. Khan maintains cordial relation with Mr. Kundu because it helps him to increase capacity utilization of the induction furnaces.

Concluding Remarks

Various innovative steps may be observed in studying the case study of Mr. Jahangir Khan are listed as followings:

- Without being a man of trade (technician) he has attempted to manage a complicated semi-high-tech engineering industry on the basis of observed experience.
- He integrated the production machine shop with the induction furnaces in order to utilize a part of the furnace capacity.
- He selected 3 induction furnaces in order to utilize the available facility to suit customer's need.
- He uses other workshops on sub contract basis to minimize capital investment on additional machines.

- He allows to use his own furnace facilities to other sub-contractors in order to improve capacity utilization.
- His cordial relation with Mr. Kundu has been innovative for mutual benefit. He could use Mr. Kundu's expertize for his own learning about testing and producing qual ity products.
- He could select, procure and install induction furnaces on the basis of his personal experiences. But he could appreciate the need to hire an Indian technician to operate the furnace. Although he appreciates the need for appointing a suitable local technician for healthy technology transfer, but he could not appoint one in time.
- He didn't participate in training programmc and foreign visits to update his knowledge and skill.

Case 2: From a simple artisan to a leading local producer of flour mill & allied food machinery

Azmiri Iron and Engineering Works (AIAEW) was established in 1962 by Md. Idris Mian. It is located at 138, Banga Bandhu Avenue, Narayanganj, Nikkon Engineering Works (NEW) was established in 1986 at 22 Shahsuja Road, Nitaiganj, Narayanganj by Mr. Nepal Chandra Shaha. Both the workshops are engaged in fabricating different types of machinery to produce consumer products like automatic flour mill, chira making machine, textile dyeing machine etc. Mr. Nepal chandra Shaha started his working life at Azmiri Iron and Engineering works as manager and later on he established his own workshop Nikkon Enginecring Works and has been continuing to work in both the units during last fifteen years.

In Pursuance of Opportunity

Mr. Nepal Chandra Shaha joined AIAEW as a manager in 1969 after appearing in Secondary School Certificate (SSC) examination. At that time AIAEW had 3-4 workers and Mr. Shaha was the only office staff. His monthly salary was Tk. 120 per month. His job was to discuss with the clients about specific job and do the costing and settle the deal and receive order. Then talk to the technicians to do the job as per order. In 1985 his salary was raised to Tk. 7000/- per month.

In 2001, AIAEW has 60 persons working in import substitution different technical positions like foreman, latheman, welder, fitter etc. Under the guidance and leadership of Mr. Nepal Chandra Shaha, over the years the AIAEW has grown in size in terms of manpower employed and volume and type of work done. They now operate three more industrial units named as (i) Azmiri Steel Casting Industry, Godnail; (ii) Azmiri Shipping Co.; (iii) Azmiri Dockyard and Marine Engineering Works.

In early years, AIAEW used to carryout repair and maintenance work of different type of machines mainly flour mills to keep the employee engaged. Periodically they fabricated China Making Machine and Small flour mill of different types such as R_3, Asano and Compact. Wheat crushing capacity of these units were 12 bags, 20 bags, 24 bags per 24 hours respectively. AIAEW have earned countrywide reputation in fabricating Automatic Flour Mill. It started in 1984, a local flour mill owner (Yousuf Flour Mill) faced problem with their imported machinery (made in Italy). They could not put the flour mill into production. The flour mill owner approached Mr. Nepal Shaha for technical assistance to put the mill into operation. After thorough study of the imported unit, Mr. Shah proposed that the unit requires balancing. It involves fabrication and installation of a blower and some auxiliary units such as radiant valves (5 Nos.), cyclone separator (5 Nos.), air shifter (5 Nos.) etc. They signed a contract with the flour mill owner for Tk. 3 lakh to do the balancing work on turnkey basis. They completed the task in 45 days and the flour mill was put into full production.

With the success story of balancing of the first flour mill a second flour mill located at Narayanganj (Najma Flour Mill) approached AIAEW to fabricate a second unit of 110ur mill for them. Najma Flour Mill (NFM) already had installed their first unit by using imported machinery (Italian). The agreement was signed with NFM for Tk. 20 lakh to deliver the automatic floor mill (40 ton capacity/24hr) within 5 months. It took 6 months to complete the tasks. It took some time to carryout trial operation and to undertake trouble shooting to bring the unit to the level of production similar to that of the imported one. During fabrication of Najma Flour Mill, AIAEW modified the design and materials of construction of different components to suit local conditions and also to reduce cost. With the completion of fabrication of the second unit of Najma Flour Mills, AIAEW was sued by Italian owner of flour mill technology (owner of patent and trademark) in 1986 for infringement of their Industrial Property Rights (e.g., patent, trademark etc). The original Italian owner of technology could not proof their claim of infringement of patent and trade mark rights. The case was dismissed by the court. AIAEW did not use any trademark on the machine and probably the life of original patent was over. Later on two foreigners (probably Italian) came to Narayanganj and entered into AIAEW with camera to take photographs of their workshop and fabrication process. They were caught for trespassing and asked them to go out; their camera was not seized. The foreigners left, after that there was no problem. With the success of fabricating flour mills in two local industries, it gave AIAEW lot of confidence and good name. They almost got the monopoly to fabricate automatic flour mills. AIAEW makes flour mills with wheat crushing capacity of 20 ton, 30 ton, 40 ton per 24 hours. Approximate weight of different models of flour mills have been reported as follows: 2 body (20 ton wheat crushing capacity per 24 hrs); 3 body (30 ton wheat crushing capacity per 24 hour), 4 body (40 ton wheat crushing capacity per 24 hour). The composition of products produced by flour mills have been reported as follows: flour 65%, ata 8%, suzi 4%, bran 22%, filter scam 1%. They need a vertical floor space of 18 feet to install flour mill machines. This particular design of flour mill is known as Air Shifter Process. In Bangladesh there is another type of design of flour mill known as Plain Shifter design which requires vertical height of 30-40 feet.

Reputation in making automatic flour mill provided good opportunity to AIAEW to get sufficient order to keep the workshop personnel busy throughout the year. It is reported that majority of the Air Shift Type automatic flour mills now operated in Bangladesh has been fabricated by AIAEW. Except the rollers needed in the mill, the rest of the components are fabricated in the workshop by using locally available materials of construction. Rollers used in flour mills are imported from Poland in cylindrical solid ingot form which it is machined to exact size and shape to suit the requirement. It is reported that on site price of a locally fabricated flour mill is 25% to that of the price of an imported unit. Wherever possible the local manufacturer of machines use materials of construction available from ship-breaking yard to minimize cost.

They do not use any working drawing for fabrication and assembly of flour mills. After fabricating different components, they help the owner to assemble and erect different components and put the mill to trial production. Over the years, Mr. Nepal Shaha worked very sincerely for AIAEW. Gradually the enterprise itself grew in size and subsequently three new enterprises were established under the guidance and leadership of Mr. Nepal Shaha. At present he is the manager of all the units of Azmiri group of industries.

In June 1986 after working for long 17 years in AIAEW, Mr. Shaha proposed to the owner Mr. Md. Idris Mian that he intends to initiate his own workshop. Mr. Mian requested him to initiate his own business and also to continue with the work as the manager of AIAEW at least for six months. Mr. Mian assisted Mr. Shaha in finding a place for his workshop. Mr. Shaha tried to divide his time between the two work places and continued working. He expressed his desire to leave the manager's job in December 1986. He was requested again to continue with the job and work in own workshop.

The process continued on and on. For the last 15 years, Mr. Shaha has been working satisfactorily in both the workshops. Mr. Nepal Shaha works in his own workshop in the morning between 7 AM and 8-30 AM and in the evening between 7 PM and 9 PM. He works as the manager of AIAEW from 9 AM to 6 PM every day. One of his nephews works as the manager of his workshop. Recently his eldest son also has joined in the workshop after completion of his B.Com examination.

Various type of machinery fabricated at NEW reported as Flour Mill, 'Chira' Making Machine, Oil Expeller, Noodles Making machine and spare parts of different machines. Total number of persons working in NEW is 25. They have also got similar workshop facilities like AIAEW. However, AIAEW has better facilities. It is very interesting to observe how it has been possible for a single individual to work simultaneously in two workshop of similar type, part of the day as a owner and part of the day as manager. Sometimes NEW uses workshop facility of AIAEW on commercial basis for sub-contracting part of work.

AIAEW has installed a 50 kV A standby generator to meet the electricity requirements of all the machinery during power failure. Various technological innovations made by AIAEW and NEW in fabricating flour mills. They fabricate the base of flour mill by using heavy Mild Steel plate obtained from ship breaking yards. Instead of using ready made Mild Steel pipe they fabricate necessary pipes by cutting and bending Mild Steel sheets.

Various innovative features observed in AIAEW and NEW are listed as follows:

- Mr. Nepal Chandra Shaha showed his entrepreneurial character by leading AIAEW to notable success. The industry not only .grew in size but also in number. He could prove himself as irreplaceable to his employer. So they allowed him to keep his job as well as to work for his own workshop. Although the action was very exceptional but it happened because it has been mutually beneficial for both the parties. In return whenever there was a need to subcontract out specific work, Mr. Nepal Shaha used the workshop facility of AIAEW for NEW's work.
- Mr. Shah tried to use the physical facilities of both the workshops optimally.
- In recent time AIAEW facility also being used to make spare parts for Azimiri Dockyard and Marine Works.
- Both the workshops engaged themselves in fabricating machinery for textile dyeing units (diversification of products) for optimum utilization of workshop facilities.

Case 3: From a little helper in the workshop to a innovator and leading local producers of bread & buiscuit machinery and other allied food producing machinery

Belayet Engineering Industries Ltd. (BElL) is located at 196/A Bangshal Road, Dhaka. It has a small workshop consisting of some general purpose machines and some open space for assembling different fabricated equipment and their trial 'operation. BEIL has specialized in fabricating automatic Biscuit and Bread Plant. Haji Belayet Hossain is the man who has made Belayet Engineering Industries Ltd: known to the investors and entrepreneurs involved in biscuit and bread making processes in Bangladesh.

In Pursuance of Opportunity

Haji Belayet Hossain had his primary education in Bangshal Maktab. He could not pursue his education after class III. In 1952, he started working in his Maternal Grand Father's Goldsmith shop. He observed that at that time many people coming from Calcutta started opening workshop at Bangshal area by using a lathe and other simple workshop equipment. He felt it more honourable to work in workshop than in goldsmith shop. He decided to work in a workshop without any remuneration; he worked there for six months. After that he was employed with monthly salary of Tk. 10 only.

Then he shifted to a different workshop at Tipu Sultan Road. There he learned to fabricate biscuit making machine from a Non-Bangali technician coming form Hugli (India). He worked there from 1954 to 1959.

In 1960, Mr. Belayet Hossain opened his own workshop at Sutrapur Bazar with a capital of Tk.700 only. He purchased a working table, a table drill, a vice and some small tools. He started making dies for candy, lozence and biscuits. He made cutting machines for biscuit factory. His work place at Sutrapur was socially not good. He shifted his workshop in 1962 to a new place at Kazi Alauddin Road with a rent of Tk. 35 per month. He earned good reputation in die making and engraving. At that time there was good demand for die makers and engravers. Most of the time he was approached by people making counterfeit products to make die to produce imitated products. He could understand their ill motive but could not help it. In 1968, he made a die for Nabisco Biscuit and Bread Factory, it was a good start. In 1973, he started working in Haque Biscuit and Bread factory. Getting opportunity to work in Nabisco and Haque biscuit factory helped him to be familiar with the machines used in biscuit and bread making industries. He started making spare parts for biscuit factories.

During repairing he got the chance to see a Sugar Grinding Machine at Haque's factory. Then he was successful to make one of his own. There was high demand for the machine. He made many sugar grinding machine subsequently. He made a rotary cutting machine by observing one in Nabisco Factory in 1973-74. He fabricated one for Huque Biscuit factory. Later on Huq brought one imported cutting machine from Japan. He started receiving servicing calls from different biscuit and bread industries to repair their respective machine. During service call, he has been paid travel expenses and lump-sum fees.

He gradually acquired the capability to fabricate different machines used in bread and biscuit factories such as moulding machine, rotary mould, horizontal mixing machine, vertical mixing machine, sugar grinding machine, bread slicing machine, candy machine.

Mr. Belayet Hossain used his technical knowledge gathered during repair and maintenance in fabricating working models of different machines. In 1986, BElL got National Industrial from I3SCIC Award for innovating different technologies.

In 1986 Mr. Belayet Hossain developed a machine to produce traditional Bengali Sweets like 'Rosgollah', 'Cham Cham', 'Golapjam'. Mr. Belayet Hossain has made a good innovation with regard to hard and soft rotary moulds. In traditional design, the moulds are made of brass and the pattern of biscuit is engraved on the brass body of the mould. During operation if a particular mould is damaged it became necessary to change the whole mould. Mr. Belayet Hossain has introduced plastic mould engraved on brass body of the mould roller. When one of the plastic mould is broken it can be changed independently. The replacement cost of the individual plastic mould is much cheaper than changing the whole body of a brass mould consisting of many moulds.

In 1989, BElL came to BUET campus to participate in an exhibition organized jointly by Bangladesh Small and Cottage Industries Corporation (BSCIC) and Institute of Appropriate Technology (I AT). They became acquainted with the researchers of IAT and started interacting with their ideas. In 1990, BEIL received National Award for the second time. In 1991-92 they felt the need for preparing a brochure to advertise the equipment and machinery fabricated by them. Researchers of IAT prepared simple description and brief technical specifications for different machines for the brochure. They sent one of their partners to participate in the Second Reverse Fngineering Short Course organized by IAT from 9-13 January 1993.

Mr. Hossain had observed that it was possible to fabricate bakery oven locally at a much cheaper cost than import. He found that he could easily fabricate the sheet metal body of insulated oven, but could not install burners because he could not procure the address of burner manufactures. None of the suppliers of oven used in Bangladesh was willing to provide him with the addresses of burner manufacturers. Moreover, he did not have the technical knowledge to select appropriate size of the burners. In 1994, Mr. Hossain approached IAT researchers to help him finding the address or burner manufacturer. IAT researchers contacted number of burner manufacturers located in Europe and China. Burners manufactured by the Chinese were cheaper than the price offered by the European firms. The researchers also helped him in finding the appropriate size of the burners. He was advised that to achieve better controllability it would be better for him to procure a combination of a number of small size burners than to procure one large size burner. He achieved notable success in procuring burners and marketing locally fabricated baking ovens. He has supplied a number of baking ovens to biscuit and bread factories located at different parts of the country.

Mr. Belayet Hossain undertook a number or visits to different cities or India (such as Bombay, Delhi, Hyderabad, Ludhiana) for assisting Bangladeshi entrepreneurs to select biscuit and bread making machines. In 1991 he had been to Thailand and Hongkok on business mission. He participated in a conference in Japan in 1991 organized by Asian Productivity Organization (APO). He is a member of Engineering Malik Samity. He did not take part in any .formal training programme. There are 49 persons working in his workshop. Some of the technicians undertake factory visits located at different parts of the country to provide ‘on site repair’ and maintenance service. For complicated repair works and for undertaking trial operation of newly installed factory, Mr. Hossain undertakes visits by himself. Bangladesh Shahid Smirity Foundation has selected Haji Belayct Hossain for Awarding Shahid Smrity Gold Medal for the year 2000.

Case 4: From a simple fitter to a innovator and leading local producers of various automobiles parts

Several cases are depicted below who developed their ways to a high level from very tiny start

Dider Engineering Pvt. Ltd.

The industry produces crankshafts of various model, sealing liner of different model, piston, gear, lube oil pump for Filling station, Agriculture and Generator. Turnover of the enterprise has decreased @ 10% per year for the last four years due to (a) entrance of China products, (b) fluctuating price of raw materials. The administration, accounting, costing, etc. are done informally in the industry. The enterprise have already exported products 3TD crankshaft in U.A.E and radiator cap in Saudi Arab in the year 2007. The following measures may be considered to improve the performance of the enterprise: (a) production process with ductile iron material to be introduced to reduce cost of product, (b) access to modern with required testing equipment facility.

A. K. M. S. Engineering Works

The industry produces high and low pressure piston, suspension bearing, rubber screw, center pivot top, center pivot bottom. Both product technology and production process can be termed as conventional. The industry gets its castings done in other industries on subcontract basis. The entrepreneur has good entrepreneurial aptitude. The capability of the technical manpower may be graded as average. The entrepreneur has good access to business information. Growth rate of turnover of piston, suspension bearing etc. is 9 to 17% per year and of clutch plate 20 to 25% per year during the last four years. The industry has little access to technical information. The administration, accounting, costing, etc. are done formally in the industry. The following measures may be considered to improve the performance of the enterprise: (a) technology and production process to be modernized, (b) manpower to be trained to upgrade their capability.

Max Automobile Products Ltd.

The industry produces various track fitting for railway, pole fittings, line hard ware. Both product technology and production process can be termed as semi-modern. The turnover of nuts and bolts and other miscellaneous items remains constant during last 4 years and the turnover of pole fittings decreased during last four year. The industry has a group of qualified staff for accountancy, costing and administrative work which are done in a formal way in the industry. The entrepreneur’s aptitude can be graded as reasonable. The capability of technical manpower may be graded as good.

Bogra Motors Pvt. Ltd.

This is a private limited company. The enterprise produces fuel filter, air filter, oil filter, gas turbine filter, heavy duty filter, hydraulic filter. The products are considered semi-modern. The enterprise has moulding facility, two induction furnace, good machining facility and heat treatment facility. This enterprise has three entrepreneurs. Among them one is B.Com, one is M.Com, one is B.Sc. Engg. (Mech.) holder. The entrepreneur’s aptitude can be graded as excellent. Higher engineering education of the entrepreneurs has enhanced their capability. The enterprise has capable manpower to do their job as per requirement. The entrepreneur has good access to business and technical information. The industry has standard organizational setup and qualified manpower to carry out administrative, costing and accounting activities. The enterprise has exported fuel filter (1000 pcs), oil filter (1000 pcs.), air filtere (500 pcs.) in Nepal and DUBAI in the year 2003-2004. Provisions of more intensive and practical work in training center, training on quality improvement, availability of low interest bank loan will help this enterprise.

Case 5: From a simple mechanic to a leading producer of various types of pumps, spare parts of various mills & factories

Several successful cases are depicted below:

K. S. D. Engineering Works

Year of establishment of this enterprise is 1990 and type of ownership is of sole proprietorship The industry produces industry pump, dredging pump, hydraulic pump. The industry has machining facilities. Consumers are satisfied at the present stage with the product quality and price, but this trend may not sustain in future Their technical capability is considered as average. The entrepreneur has good access to local business information. The turnover has been increasing at an average rate of 25% per year over the last four years. The entrepreneur has little access to technical information. The enterprise possesses one accountant. The administration works are done informally in the industry. Lack of modern technology, lack of R&D facility and lack of capital is the main problem of this enterprise. The following measures may be considered to improve the performance of the enterprise: (a) technical capability to be enhanced, (b) market access to be expanded.

Milnars pumps Limited

The enterprise produces turbine pump, centrifugal pump, sluice valve, submersible pump, The enterprise has one induction furnace, one copula furnace, machining facilities and one pump testing unit. The capability of technical manpower may be graded as good. Production process of this industry is modern and possesses skilled manpower. The industry has a group of qualified staff for accountancy, costing and administrative work which are done in a formal way in the industry. Technical support may improve the performance of the enterprise.

The Padma Engineering Works

The industry produces plastic injection, mold, pantograph, hanger. It's turnover (hanger) has been increasing @ 20% per year during last three years. The enterprise already exported hanger in France and Canada in the year 2003 and 2004. It has little access to technical information. Administration, accounting, costing, etc., are done informally in the industry. The following measures may be considered to improve the performance of the enterprise: (a) technical capability to be enhanced, (b) export diversification to be made with more number of products.

Alim Engineering Industries Ltd.

The enterprise produces rice crasher, power tiller, rice cutting machine, hydro tiller, cored chopper, low lift pump drier etc. The products of this enterprise may be term as conventional. The enterprise has pit furnace, moulding facility, machining, heat treatment, polishing and surface treatment facilities. The enterprise also has hardness testing, load bearing capacity testing facility. The production technology may be graded as modern. The entrepreneur has excellent entrepreneurial aptitude and carries out production work successfully. He has efficient manpower who are able to do their job as per requirement. The industry has standard organizational setup and qualified manpower to carry out administrative, costing and accounting activities.

Kijam Metal Industries Ltd.

The enterprise is involved in the production of pressure cooker, non stick cook ware, aluminum utensils, aluminum sospan. The products are considered as conventional to semi modernThe enterprise has one copula furnace, two pit furnace, molding, casting, machining, and heat treatment facility. The entrepreneur's aptitude can be graded as good. The capability of technical manpower may be graded as average. The industry has standard organizational setup and qualified manpower to carry out administrative, costing and accounting activitiesThe enterprise has exported assorted house hold in Jedda, SaudiArabia in the year 2001, aluminum pressure cooker and utensil in India in the year 2002, aluminum plate in different size in India, Australia in the year 2003.

Case 6: From a tiny enterprise to a leading owner of casting industries

Comilla Engineering and Casting Limited

The industry produces hand pump for WASA, tara pump for DPHE, centrifugal pump and dresser coupling for BADC, manhole cover for UNICEF, switch valve, saw machine for DANIDA. The enterprise has two accountants for accountancy, costing. Administration is done informally in the industry. This enterprise has exported hand pump (1000 pieces and 2000 pieces) in Vietnam and Nepal in the year 1988 and 1995 respectively. Their product has 100% demand in the local market. In 2005 the industry is going to export 2000 pieces hand pumps in Nepal.

M. D. Steel Casting Industries Ltd.

The enterprise produces different types of SS pump for cement and fertilizer industries, MS and SS nut bolt for steel mill, railway, steel cutting parts, corogetted machine etc. The industry has good machining facility (lathe machine-6, drilling machine-2, shaper machine-1, miling-1, grinding-2 etc.). It also has one induction furnace of capacity 1000 Kg. The technological capability of the entrepreneur is graded as good. The skill level of the employees is average. Administration, accounting, costing, etc. are done informally in the industry. The industry has its own product testing facility and R&D department.

Mohammadia Iron Industries

The enterprise produces CI manhole cover, dresser, coupling, gate valve, hand pump, foot pump, sanitary fitting, rerolling mill, rice mill, oil mill, concrete mixer machine, salt iodized machine etc. This company has acquired good machining and molding facilities. Production technology of this company is ranked as semi-modern. The entrepreneur's aptitude can be graded as good. Technical employees are also good at present. Administration, accounting, costing etc are done informally in the industry. However the company reported that VAT/tax on raw material is high. The administration, accounting, costing, etc. are done informally in the industry.

The Eastern Engineering Works Limited

The enterprise produces leaf spring, coil spring, buffer spring, leminated spring, coupler, coupling hook, hanger belt, piston liner clip, excel pulley. The products can be termed as semi-modern. Its main production facilities include machining, forging, heat treatment, testing facility. The production technology used by the enterprise is conventional. The entrepreneur's aptitude can be graded as good. The technical capability of the enterprise may be graded as good. The enterprise has good business information. The industry has standard organizational setup and qualified manpower to carry out administrative, costing and accounting activities.

Saiyad Welding & Engineering Works

The enterprise produces gas regulator, service tee, elbow, nipple, lock wingcock.. The products may graded as conventional to semi-modern. Its main production facility includes machining, testing facility which may be termed as conventional. The production technology it uses is conventional. The skill of the entrepreneur is reasonable and that of employees is average. Administration, accounting, costing, etc. are done informally in the industry.

Chapter 4

Technology Platform in Use in Light Engineering Sector

4.1 The technology platform in use

By technology platform, we generally mean the production techniques in use, the factor proportions prevalent in these vertical industrial sectors, bearing in mind that we shall need to use an acceptable definition of technology.

4.2 Overview on Manufacturing Process of LES

The main production processes used by ES and LES in Bangladesh are shown in Fig. 4.2. Casting, forging, rolling, extrusion, sheet metal forming, wire drawing, spinning are mainly used by different industries to shape a metallic component. After being shaped, the product may undergo heat treatment, surface finishing etc. However, as will be elaborated later heat treatment is used only to a very limited extent in this country. The production processes for each of the major metallic materials are indicated in Table 5.3.

4.3 Production Line

Product line of Light Engineering Sectors needs standard & systematic production process. The production process of LEIs is different for different products. A typical production process is illustrated below:

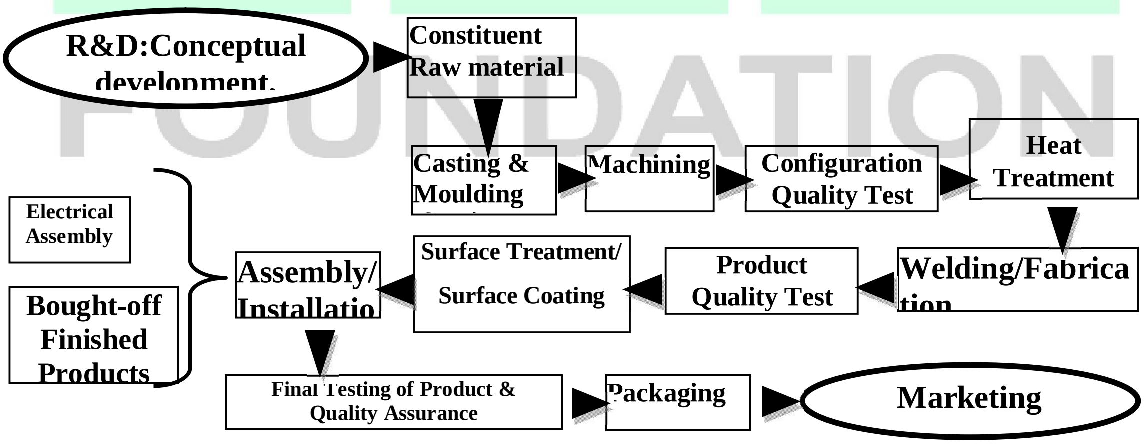


Figure 5: A typical Production Line of LE Products

Table 16: Production Processes Used for Major Materials

Processes	Ferrous		Non-Ferrous	
	Gray Cast Iron/ Alloy Cast Iron	Plain Carbon Steel/Alloy Steel	Copper Alloys	Aluminium Alloys
Sand Casting	√	√	√	√
Permanent Mould Casting				√
Hot Rolling		√		
Cold Rolling		√		√
Forging		√		
Extrusion				√
Sheet Metal Forming (Shearing,Bending, Deep Drawing etc.)		√	√	√
Spinning				√
Wire Drawing		√	√	√
Heat Treatment*	√	√	√	√
Galvanising	√	√		
Electroplating (Cu/ Ni/Cr)		√	√	
Welding	√*	√		√
Brazing/Soldering			√	√
Painting	√	√	√	√
Tube Forming		√		

**Used only to a very limited extent*

Source: SMEF Survey, 2008

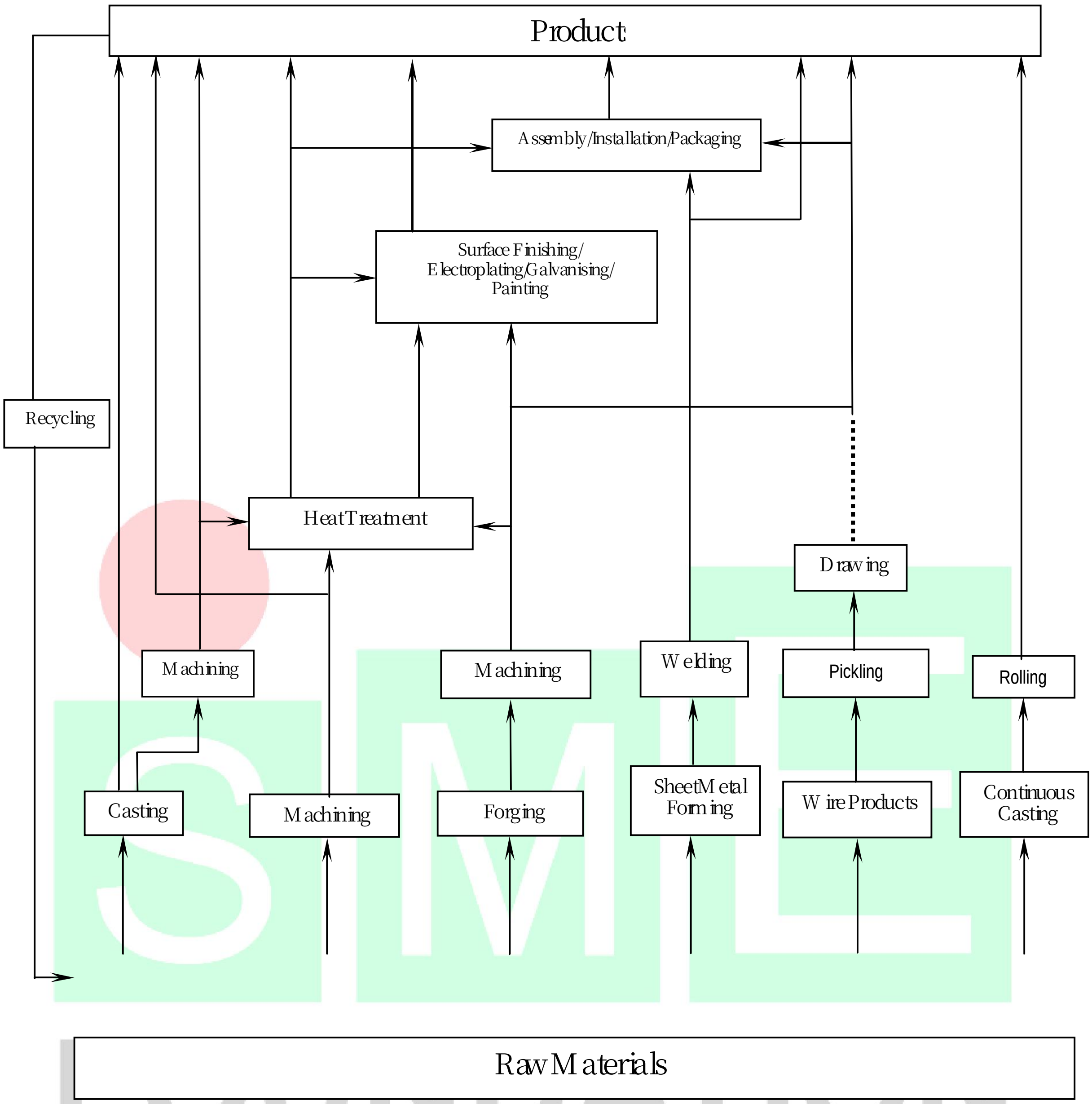


Figure 6: Typical Production Processes Used for Metallic Materials.

Technological and Quality Upgrading

Technological capability is a competitive differentiator of critical importance. This is especially true when the world of production and competition is a global village. China and India, especially China, is not just attracting very large dollops of foreign direct investment but also large and medium multinational companies who are eagerly transferring proprietary technologies to China and then training up the Chinese in using sometimes quite advanced technologies. That has raised the bar quite significantly for the competition, including what is a potential competition with a "long-shot" such as Bangladesh. This is why technological upgrading is exhibit number 1 when it comes to "binding constraint". This is no longer a time for banal platitudes, of the kind that many government and donor pronouncements are made of. Nothing short of a very determined effort to draw level with, sometimes even leap-frog, a deadly serious competition is called for.

Technology embraces (i) manufacturing process; (ii) product functionality, durability and user convenience; (iii) product aesthetics; and finally (iv) the aesthetics and environmental dimensions of product packaging. Technology can-do that makes a difference thus is a versatile and challenging package. Stanford University technology historian Professor Nathan Rosenberg called science *papyrocentric*, something that loves publicity, but technology *papyrophobic*, something that loves anonymity. Profitable technology demands diligent digging and is inherently costly, because it is largely proprietary. The market for proprietary resources is always prone to imperfections, either because sellers have an insurmountable informational advantage, or because demand, discouraged by high prices characteristic of low initial volume, never picks up: a case of information asymmetry again. Asymmetries in access to credit markets --- another permanent fixture of under-development --- compounds the first problem. Plugging the competitive technological gap afflicting especially small enterprises will require accent on (i) attracting foreign direct investment (FDI) of the right kind; (ii) negotiation of minimalist "local-content" guarantees through the Board of Investment; (iii) scoping, and providing seed-money for, applied R & D under the aegis of the SME Foundation and the DCCI, for instance; (iv) determining requirements and funding for creating and/or augmenting the infrastructure of R & D, to name the four that come to the mind instantly. All of that will put a premium on deliberate, resolute and informed public interventions, including public-private partnerships, all executed cost-effectively and flawlessly. No doubt, in discharging that mandate, catalysts and providers will all require building of their own capacities, for conception, discovery and implementation. Above all, political will, at all levels of governance --- within the government, in the civil-society organizations, in the private sector---will need to be stirred, marshaled and then aimed at this binding constraint. Technical universities, research institutions, training institutions will be better equipped and empowered to strengthen their R&D profiles from the perspectives of potential private sector adopters. The SME Web Portal will be leveraged up to the hilt for this end. Institutional reforms in terms of sharing the risks and returns to innovation between the private, often young, inventors/innovators and civil-society organizations, using market-friendly trade-off schemes will need to be experimented and then gradually brought into the mainstream.

Production technique in use in the Light Engineering Industries

Generally following steps are required to follow to develop a quality engineering products:

a. Selection of materials for the product
b. Shaping of the product by casting and/or working
c. Machining of the product
d. Heat treatment of the product made of steel or other non ferrous alloys
e. Determination of mechanical properties viz., hardness, yield strength, ultimate tensile strength etc.
f. Investigation of microstructure to develop the required properties of the products.
g. Quality assurance by identification of product defects

Figure 4 shows the schematic diagram of the production line of products with necessary equipments and machineries. Table-17 shows the variety of production techniques in use in the industry. As well, it shows the average number of machines of various kind that are employed in the light engineeringindustry of Bangladesh.

Table-17: The diversity implicit in the technology platform in the Light Engineering Industries (No. of machines/equipment per establishment)

Average number of machines per establishment

Firm sizes	Lathe	Welding	Cutter	Drill	Grinding	Shaper	Spinner
Micro	2.12	1.44	1	1.22	1.8	1	--
Small	4.13	2.32	4	2.425	2.09	1.63	13.58
Medium	9.64	2	2	2.5	2.75	3.75	6
Large	11.5	--	25	--	15	--	22
MiSmall	3.28	2.06	3.47	1.94	2.02	1.49	13.58
MeLarge	10.06	2	9.67	2.5	5.2	3.75	16.67
All	4.52	2.03	4.4	1.96	2.35	1.7	14.2

Note: The numbers in the foregoing table are based only on the number of 'core' machines, both those bought new or in used condition. The number of auxiliary tools and devices has not been included in this calculation.

Source: SMEF Survey, 2008

The Table 17 shows average number of machines per establishment; it shows that lathe machines are common tool in LEIs and highest number goes to spinner.

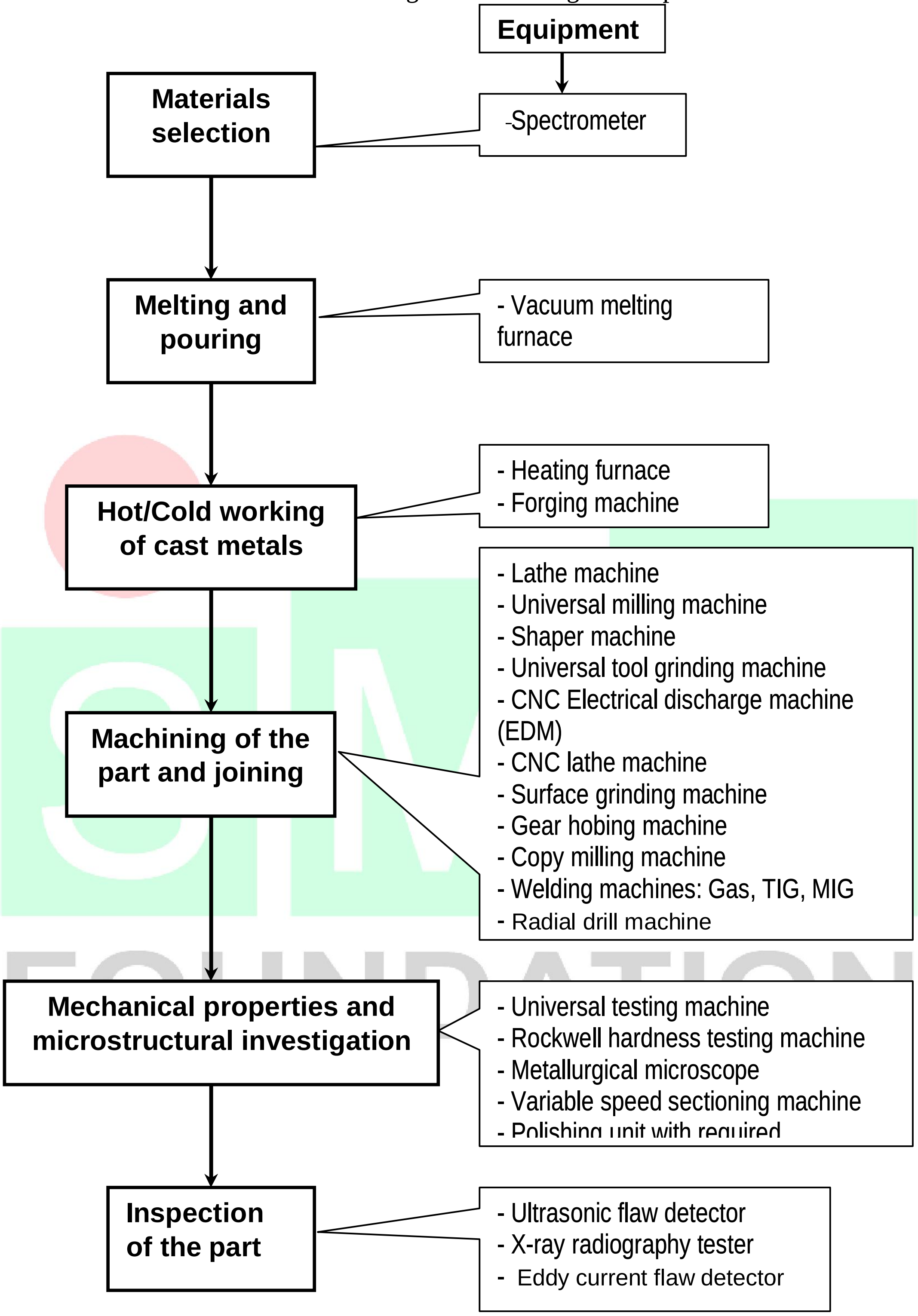


Figure 7: Schematic diagram of production line of Engineering Products

The next table (Table 18) presents the unit values of these categories of machines. Before proceeding any further, it is necessary to appraise oneself about how these replacement costs were evaluated. During the survey, we assessed the value of capital equipment in three ways, namely, ‘replacement’ cost, ‘resale value’ and (historical) acquisition cost. The question asked of the respondent while evaluating the replacement cost was: “What would it cost today were this piece of equipment, as it is, were to be purchased today?” The question is quite straight-forward where new equipments are concerned. But what about used machines? Now, experienced entrepreneurs or chief technologists typically have an idea about what a given piece of equipment would likely cost in today’s prices. Unless the industry manufacturing that particular piece of equipment were characterized by a high rate of technological obsolescence, such ideas would likely also be fairly accurate. Our Survey Research Analysts (SRAs) were typically able to develop a warm rapport with our respondents. People largely cooperated. Thus, we were able to generate a fairly accurate characterization of the investment in fixed investment in plant and machinery (not counting value of land, building and structures) by these establishments. It would be recalled that the SME Policies Strategies 2005 stipulates that establishments with up to Tk. 1.5 million worth of plant, machinery and equipment (not counting value of land, building and structures) should be treated as ‘small’. And establishments with between Tk. 1.5 million and Tk. 100 million worth of plant, machinery and equipment (not counting value of land, building and structures) should be treated as ‘medium’. Now that we have this data relating to replacement cost on hand, we shall now be able to classify sample observations according as whether they are ‘micro or small’ or ‘medium’, from the perspective of SME Policy Strategies 2005.

Table 18 is about the economics of the technology platform characteristics of the Light Engineering Sector. Here, we present average price of each type of machine or equipment for each of the size classes of establishments. Several findings from this table rate a mention. Firstly, it is the lathe, grinding and shaper machine that represents the richest segment of the in the Mismall enterprises in the light engineering sector, with each Lathe machine costing something like Tk. 136,070 to 315,000, each shaper and grinding machine costing something like Tk. 188,670 to 357,500. each grinding machine costing something like Tk. 29,910 to 714,000. These machines are the work-horses of hundreds of small, medium and large enterprises that have sprang up in the country since about several decades.

Table-18: The diversity implicit in the technology platform in the Light Engineering Industries

Average unit price of different machine(taka thousand)

Firm sizes	Lathe	Welding	Cutter	Drill	Grinding	Shapper	Spiner
Micro	136.07	26.22	29	28.19	29.91	188.67	--
Small	270.56	30.91	156.43	66.26	347.23	363.22	34.17
Medium	304.88	45	200	42.50	714.00	357.50	35.00
Large	315.00	--	250	--	250.00	--	32.50
MiSmall	214.11	29.55	133.94	50.92	273.44	322.94	34.17
MeLarge	307.13	45	216.67	42.50	621.20	357.50	33.33
All	329.51	30.03	146.35	50.67	309.66	326.16	34.00

Note: All numbers in the foregoing table are based on replacement costs of the equipment

Source: SMEF Survey, 2008

Foregoing two tables (Table 19 & 20) enable us to estimate total replacement cost of all plant and core machinery in use in the industry.

Table-19: Average total machine cost per establishment in the Light Engineering Industries

Average total machine cost per establishment

Firm sizes	Lathe	Welding	Cutter	Drill	Grinding	Shapper	Spiner	All
Micro	288.1	37.9	29	34.4	53.8	188.7	--	632
Small	1116.8	71.7	625.7	160.7	726	593.3	464.1	3758.2
Medium	2939.9	90	400	106.3	1963.5	1340.6	210	7050.3
Large	3622.5	--	6250	--	3750	--	715	14337.5
MiSmall	703.1	61	464.9	98.8	553.2	480.3	464.1	2825.4
MeLarge	3088.4	90	2094.4	106.3	3230.2	1340.6	555.6	10505.5
All	1487.8	61	643.9	99.3	729	553.7	482.8	4057.5

Source: SMEF Survey, 2008

Table-20: The diversity implicit in the technology platform in the Light Engineering Industries

Percentage distribution of total cost of machinery by size classes of establishments

Firm sizes	Lathe	Welding	Cutter	Drill	Grinding	Shapper	Spiner	All
Micro	45.6	6	4.6	5.5	8.5	29.9	--	100
Small	29.7	1.9	16.6	4.3	19.3	15.8	12.3	100
Medium	41.7	1.3	5.7	1.5	27.8	19	3	100
Large	25.3	--	43.6	--	26.2	--	5	100
MiSmall	24.9	2.2	16.5	3.5	19.6	17	16.4	100
MeLarge	29.4	0.9	19.9	1	30.7	12.8	5.3	100
All	36.7	1.5	15.9	2.4	18	13.6	11.9	100

Source: SMEF Survey, 2008

Table 21: Utilization and valuation of land resources used on the sample

Farmsize classes	Percentage of cases own land	Percentage of cases rented land	Percentage of both own and rented land farm	Total	Ave land use per farm(decimal)	Ave amount of lease per month(taka thousand)	Ave amount given at once(taka thousand)	Ave value of own land & establishment (taka thousand)
Micro	15.79	84.21	0	100	0.97	15.23	121.06	2458.33
Small	24.14	73.56	2.30	100	6.25	10.34	248.84	9125
Medium	29.41	52.94	17.65	100	27.40	44	497	22875
Large	62.5	0	37.5	100	76.10	11.5	225	84000
MiSmall	21.6	76.8	1.6	100	4.63	11.92	208.49	7586.54
MeLarge	40	36	24	100	42.98	33.17	451.67	43250
All	24.67	70	5.33	100	11.07	14.28	250.78	18848.68

Source: SMEF Survey, 2008

Polymers/resins are imported raw materials. Machinery is mainly imported. But in some industries, locally produced machines are also being used. Chemicals are mainly imported. Some companies also use locally produced chemicals (e.g., sulphuric acid, ferrous sulphate etc.). Industrial gases except argon are local. Solid and liquid fuels are imported. But it is expected that local coal will be available in 2004 from the Barapukuria coal mine.

Chapter 5

Capital-labour ratio, Average Physical Productivity (APP) and Marginal Physical Productivity (MPP)

5.1 Introduction

Factor proportions---the proportions in which labour and capital are utilized in production by the establishments---constitute an important dimension of a narrative concerning the technology platform in any real-life industry. Bangladesh is a labour-surplus but capital-deficient economy. The use of capital relative to labour is therefore emblematic of how parsimoniously is capital combined with the relatively surplus labour in an effort to create value-added in manufacturing. Motivated thus, we have estimated capital-labor ratio for the sample. The measure of capital in this context is always based on the fixed capital used by the establishments. By fixed capital, we mean replacement cost of plant and machinery, plus the value of other support capital stock (such as vehicles, generators, furniture and fixtures, and the like).

Economic theory suggests that both labour and capital productivities depend upon the factor proportions that are binding. Certain production processes---such as fertilizer, steel, etc. --- are inherently machine-paced, requiring high degrees of mechanization and high ratios of fixed capital to labour used. These processes are more likely to be relatively integrated production technologies. Certain other production processes represented inherently more fragmented technologies, with different factor proportions in different segments of the plant. For instance, while the manufacture could use relatively little automation, packaging might involve high degree of mechanization and automation. In Bangladesh, the preparation of processed food increasingly resembles this narrative. Be that as it may, the point that seems presently important is to stress that factor productivities closely correspond to factor proportions, and have therefore to be discussed in combination.

The theory is that capital is the scarce factor of production and labour is the relatively abundant factor of production. More mechanized techniques of production represented by more modern and faster and more sophisticated machinery set up cost more to create and therefore to acquire. In theory, a production process of which the factor proportions are relatively higher compared with another one embodies more capital and technology resources per unit of labour---the abundant resource--- and ought therefore to produce more per unit of time. This is why it is imperative to glean an idea of where the factor proportions are in any study industry.

Average Physical Productivity of Labour and Machine

Table-22 shows the factor proportions prevailing in Bangladesh's light engineeringindustry.

Table 22: Capital-labour ratios and physical productivity in Light Engineering Industries, 2006/2007

Enterprise Status	Capital-labour ratio (Tk Thousand)	Labour productivity per year (units)	Machine productivity per year (units)
Micro	69.97	2.00	1.08
Small	75.99	4.11	10.74
Medium	63.12	2.49	13.64

Enterprise Status	Capital-labour ratio (Tk Thousand)	Labour productivity per year (units)	Machine productivity per year (units)
Large	77.36	2.35	15.20
Mismall	74.16	3.47	7.80
Melarge	67.68	2.45	14.14
All firms	73.08	3.30	8.86

Source: SMEF Sample Surveys 2008.

Several findings deserve being expanded upon. First, capital-labour ratio is found to increase from the 'micro' to 'small' and 'medium to large' establishment classes, highest being for the large establishments. 'medium' is smaller than 'micro' by 10.9%. The average capital-labour ratio of the MeLarge establishment class is less by its 9.6% than MiSmall establishment class.

Marginal Physical Productivity

Having discussed the technology platform in some detail, we now move on to characterizing technologies in terms of their underlying production-function characteristics. To do so, we shall need to fit production functions to the data. To do so satisfactorily requires some comparative discussion of the specifications of different production functions and what they mean in terms of important attributes of such production functions.

Table 23: Productivities and Elasticities

Firm Size	Labour Productivity	Machine Productivity	Marginal Labour Productivity	Marginal Machine Productivity	Labor Elasticity	Machine Elasticity
Micro	2.00	1.08	-0.284	-0.014	-0.275	-0.021
Small	4.11	10.74	4.294	0.022	1.051	0.004
Medium	2.49	13.64	6.538	-0.376	2.524	-0.034
Large	2.35	15.20	-0.0467	10.98	-0.024	0.834
Mismall	3.47	7.80	4.53	0.299	1.192	0.068
Melarge	2.45	14.14	0.732	9.914	0.325	0.820
all	3.30	8.86	1.494	1.958	0.523	0.311

Source: SMEF Survey, 2008

Cobb-Douglas Production Function

No discussion of physical productivities can proceed very far before invoking tried and tested concepts of production function, such as Cobb-Douglas (CD) or Trans-log (TL) production functions. These production function provide a representation of the production technology that underlie the actual situation of a given sample of firms. To a discussion of these two classes of production as established by our data that we now turn.

CD has been the functional form of a production function of the longest standing in the applied economic literature. This well-known function is represented by the formulation:

$$Q = AL^{\alpha}K^{(\alpha-1)} \quad \text{...}(1)$$

Where Q represent the level of output;
A represents, in an abstract sense, the state of the technology;

L represents the amount of labour used by the technology;

K represents the amount of capital used by the technology.

With a suitable logarithmic transformation of the equation (1), we get

$Ln(Q) = LnA + \alpha LnL + (\alpha\text{-}1)LnK$ ……………………………….(2)

Alternative production functions include the Cobb-Douglas and CES (Constant Elasticity of Substitution) production functions. The Cobb-Douglas production function is given by:

$$\ln Q_{j,t} = \beta_0 + \sum_i \beta_i \ln X_{j,i,t} - u_{j,t} + v_{j,t}$$

All inputs are preferably to be measured in physical units. Thus Q will be measured for the Light Engineering Sector using physical units (eg yards or pieces), L will be measured using person-years and capital in capital-years.

With a CD production function, the returns to scale is unity, and the elasticity of substitution between labour and capital is also equal to unity. There have been a large number of studies using Bangladeshi data of whether the Cobb-Douglas formulation remains a relevant representation of the underlying technological relationship between input and output in several industries. Thus for instance, Ahmed (1992) has researched the returns to scale in manufacturing in Bangladesh using the CD formulation. As well, Chowdhury and Ahmed (1999) have estimated returns to scale in several industries using the CD formulation.

A more flexible form of production function that is worth considering here is the Trans-log Production Function. The most frequently used being a translog function, which is a second order (all cross-terms included) log-linear form. This is a relatively flexible functional form, as it does not impose assumptions about constant elasticities of production nor elasticities of substitution between inputs. It thus allows the data to indicate the actual curvature of the function, rather than imposing *a priori* assumptions. In general terms, this can be expressed as:

$$\ln Q_{j,t} = \beta_0 + \sum_i \beta_i \ln X_{j,i,t} + \frac{1}{2}\sum_i \sum_k \beta_{i,k} \ln X_{j,i,t} \ln X_{j,k,t} - u_{j,t} + v_{j,t} \quad \text{...(5)}$$

where $Q_{j,t}$ is the output of the establishment *j* in period *t* and $X_{j,i,t}$ and $X_{j,k,t}$ are the variable and fixed establishment inputs (*i,k*) to the production process. As noted above, the error term is separated into two components, where $v_{j,t}$ is the stochastic error term and $u_{j,t}$ is an estimate of technical inefficiency.

Empirical Implementation of the Production Function

Of both the CD and TL production functions, we implement two versions each. The first of these is a traditional CD functional form, in which output is said to be a function of just labour and capital. Labour in this case is about all kinds of labour, including the white collar workers too in the mix. Capital is about fixed capital, about which we have had occasion to say quite a few things already. The alternative functional form throws into the melting pot a third variable, namely, the sumtotal of material inputs. Such inputs include raw materials of all kinds that have been used in production. We estimate each of the production functions in one of three alternative versions, the chief differentiator among these three is whether we measure the 'output' in physical or value terms. Where output is in physical terms, the dependent variable is measured in units of the homogeneous-output already talked about.

In that case, labour and inputs are also measured in physical terms---labour in person-years, and input in units of homogeneous-inputs.[90] Fixed capital is always measured in monetary terms. When it comes to estimating the production function in TL forms, having three explanatory variables mean that there are in all nine variables on the right hand side of the production function form (not counting the constant term). The following table presents the estimates of the coefficients of both forms of the production function.

Table 24: Coefficients of production functions (of various kinds), 2006/2007

Explanatory variable	Cobb-Douglas				Translog			
	Version 1	t statistic	Version 2	t statistic	Version 1	t statistic	Version 2	t statistic
Const.	4.730	10.930	6.495	21.926	1.587	1.261	6.902	8.153
Ln(L)	0.919	9.879	0.465	5.691	0.799	2.050	-0.682	-2.582
Ln(K)	8.814E-02	1.257	-2.23E-02	-0.471	1.012	2.783	0.181	0.761
Ln(I)			0.489	12.949			1.042	6.803
Ln^2L					0.154	1.246	1.483E-02	0.149
Ln^2K					-0.108	-1.731	-3.70E-02	-0.913
Ln^2I							-8.33E-02	-4.920
lnL. lnK					-4.50E-02	-0.652	8.730E-02	2.015
lnL. lnI							0.115	2.817
lnK. lnI							-7.84E-02	2.817
R^2		0.502		0.799		0.527		0.863
F-statistic		74.171		192.039		32.137		97.089

Source: SMEF Survey, 2008

According to the Cobb-Douglas specification, the returns to scale is constant. Both coefficients are highly significant and intuitively signed. The TL function too is fairly well-behaved, with most of the coefficients being intuitively signed and statistically significant. The TL set of results suggest that the returns to scale are slightly increasing.

TL functional forms add slightly to the r-squarred, but subtract from the F-ratio. We seem to have a trade-off to make.

We also test for whether returns to scale are constant in this industry. The steps adopted leading up to the test are as follows:

For this industry, we find that the null hypothesis that returns to scale in it are constant can not be rejected. Increasing returns to scale are not proven for the light engineeringindustry.

Determinants of labour productivity

We next turn to the determinants of labour productivity across firms. The explanatory variables on which we regress estimates of labour productivity include the following:

1. Average product price;
2. Fixed capital per worker;
3. Bank credit per worker;
4. Percentage of output exported;
5. Percentage of imported materials, parts and components in firm input-mix;
6. Length of formal schooling on the part of the Managing Director

[90] Once again, we use price relatives, this time for inputs, in order to 'chain' comparator inputs into units of 'benchmark' input.

7. Length of any specialized training attained by the Managing Director;
8. Three firm size dummy variables;
9. Two location dummy variables, to correspond to location in Dhaka and Chittagong;
10. Age of the firm.

Table 25: Determinants of labour productivity in the Light Engineering Industries of Bangladesh, 2006/2007

	Gross value added/worker	
	B	t-stat
Constant	-7.980	-0.37
Worker experience	9.697	0.475
Bank loan dumy	435.374	1.504
Fixed capital/Labour	0.815	1.732
Micro	354.489	1.392
Medium	-269.429	-0.762
APP	3.517E-03	0.702
Chittagong	533.784	1.994
R-square		0.075

Source: SMEF Survey, 2008

We estimate both functional forms using data from the light Engineering Sector of Bangladesh. Using the two sets of data, we compute and present two sets of average physical productivity (APP) and marginal physical productivity (MPP).
The following tables report on the coefficients of the two classes of production functions that we have fitted to the data.

For each of the size classes, we also present these estimates. That said, we present a couple of caveats attaching to the methodologies before proceeding any further.

It is typical in traditions of applied production research literature to estimate coefficients of production functions using a single-equation estimator. Many example of such a use of such a procedure can be found in the literature relating to manufacturing industries of Bangladesh (). It needs to be pointed out categorically that the use of such a procedure leaves something to be desired. It has been well-established for sometime now that in specifications such as this one, the disturbance term is correlated with measured labour input or measured capital input. Because only the quantity of the measured labour or capital input enter the equation (1) or (2), the worker quality can only appear to be a part of the disturbance term. The quality or the relevance of experience, or the educational qualification of workers will frequently depend upon the spatial distribution of the supply of opportunities of educational or training upgrading. The supply of educational or training facilities, mostly a preserve of public or voluntary-sector activities, is treated as part of the disturbance term in equation (1) and (2). And yet it is incontrovertible that this supply is not without some effect on the quality or competency or relevance of the skills of workers, which are bound to affect the average or marginal productivity of workers in the study industry. The presence of correlation between the explanatory variable and the disturbance term in equation (1) thus is a tell-tale presence of a simultaneity bias in equation (1). This needs mitigation.

On another level, it is quite likely for the measured capital input to also be correlated with the disturbance term. Why? The selection of a best-practice stock of machines is desirable for everyone, but it takes a special skill, it takes experience, and it takes specialized knowledge. To the extent there is an active market to trade such skill or knowledge, such market is unlikely to have a national footprint but is quite likely to be concentrated in the capital city or the lone port city, squeezing the locations outside the capital or the port city. To put it differently, the spatial distribution of such markets of critical importance, which affects the productivity of capital machinery, will typically be treated as part of the disturbance term. The presence of correlation between the explanatory variable and the disturbance term in equation (1) thus is a tell-tale presence of a simultaneity bias in equation (1). This again needs mitigation.

More formally, in order to obtain a quantitative measure of the contribution of factors to firms' production, we need production function parameter estimates that are consistent. A firm with high total productivity---typically lumped with the disturbance term in the econometric estimation---will hire more labour and other variable inputs. This correlation between the productivity part of the residual (seen by the firm's manager, but not by the econometrician), and the observed values of the variable results in biased parameter estimates.
We shall therefore need to implement a two-stage procedure to purge the implementation of equation (1) and (2) of the presence of simultaneity bias: in short, we shall implement an instrumental variable approach. The instruments that we shall use are as follows:

a) The number of public-sector colleges and universities within the jurisdiction of the districts whence our sample has come;
b) The number of public and private training institutes within the jurisdiction of the districts whence our sample has come;
c) The number of firms selling specialized professional services (providers of technical assistance) of one kind or the other within the jurisdiction of the districts whence our sample has come;
d) The number of branches of banks and leasing companies within the jurisdiction of the districts whence our sample has come;
e) The number of licenced micro finance institutions (MFIs) within the jurisdiction of the districts whence our sample has come;
f) The number of business enterprises within the jurisdiction of the districts whence our sample has come.

Using these instruments, we conduct our Two-stage Least-Squares (2SLS) estimation of the production function. The results from doing so are presented in the following table.

Estimating returns to scale in the Light Engineering Industries of Bangladesh

Some production functions are linearly homogeneous of degree one. A production function is linearly homogeneous of degree one when doubling the quantity of each input in the production function also doubles the output that can be obtained from it. Alternatively put, the returns to scale on a linearly homogeneous production function of degree one are also unitary. In such a case, returns to scale are also said to be constant. It is of some importance to be testing the foregoing two estimated production functions for the constancy of the returns to scale. It is now to this that we turn.

Productivity gap between clusters within the industry, and the industry itself

The production functions point up a summary picture which holds true for the sample in question as a whole. This same is true when it comes to estimates of the total factor productivity function---another set of summary results. These results appeal well when one is interested in sample-wide insights. If, as is quite likely, one is interested in intra-sample insights and results, estimates of production function strike one as if 'one is dressed well with no place to go'. One is in this uncomfortable position whenever, as now, diagnostic results and diagnostic insights are warranted. Here, one is interested in getting estimates of inter-firm 'scores' or 'ratings' even as one uses data on firms' output and inputs in an effort to see how the two stack up.

It is here that we, like many researchers before us, invoke the stochastic frontier function (SFF), which was first independently by both a Dutch team of econometricians, and also by Aigner, Lovell and Schmidt (1977). Subsequently, important work in this tradition was done by Kumbhakar (1982). The specification of the SFF is as follows:

The formulation is such that it is practicable to calculate the productivity deficit of each sample observation from the 'stochastic frontier' for the industry in question. This is how we plan to calculate the productivity gap of each of the clusters relative to the frontier production function estimated for that industry.

First of all, we need to talk about how we established the various clusters that populate the light engineering industry of Bangladesh. We identify seven clusters in this industry: Dhaka; Chittagong; Tangail; Dinajpur; Bogra, Rajshahi and Khulna. The following table shows the productivity deficits for each of the clusters.

5.3 Estimation of Stochastic Production Function

Using stochastic production frontiers in differentiating the firms on any given sample in terms of a well-accepted metric of firm performance is an oft-used method in applied industrial research. We, too, would be using such a method. We reproduce below work in which distance of sample of observations from an estimated stochastic frontier is regressed upon quite a number of explanatory variables in order to generate a diagnostic analysis of some value.

Table 26: Estimates of the coefficients of the stochastic frontier production function, using MLEs

Frontier estimate				
Coefficients	**least square estimate**	**t-value**	**Half normal estimate**	**z-value**
constant	4.72	10.93	4.7381	2.70
β_L	0.9191	9.88	0.9191	9.98
β_K	0.088	1.26	0.088	1.27
σ_v			1.1093	
σ_u			0.0107	
σ	1.118		1.109	
λ				

Source: SMEF Survey, 2008

The Drivers of Estimated Technical Inefficiency

Following the lead of the analytical model developed in Annex-II and using estimates from Table 25 of the standard errors of the two components of the error term---one distributed as a normal variate and the other distributed as a truncated, half-normal variable, we estimate the 'distance' of the value added registered by each sample observation (which is a kind of measure of efficiency) from an estimated stochastic production frontier. We then regressed this distance on a number of behavioural or strategic choice variables, such as opting for (or obtaining a) bank loan, fixed capital provisioning per workers, average product price, etc. The explanatory variables on which distance from the frontier is regressed include the following:

EDUC= Number of years of schooling of the Managing Director's formal schooling (natural log of years);

PER_EXP = % of the firm's output that is exported;

CHT_DUM = A dummy variable that takes the value of unity for Chittagong and zero everywhere else;

DHK_DUM = A dummy variable that takes the value of unity for Dhaka and zero everywhere else;

AV_P_PR = Average product price (natural log of Taka);

B_LOAN = Bank loan;

AGE = Number of years since the establishment of the firm;

The following table presents the results obtained from the regression analysis:

1. Having a bank loan reduces distance from the production frontier. This suggests that bank loans induces greater efficiency in this industry compared with firms that are more internally financed;
2. Enhancing the formal education length of the Managing Director is found to have a positive effect on the efficiency of the firm;
3. Average product price fosters greater inefficiency, presumably by breeding complacency.

The point of presenting these results is that one can harness relatively advanced methods and still demonstrate results with diagnostic values in formulating policy stances. Certainly, in this implementation, we would be spending a lot of time trying out various models of policy diagnostics on the data that we shall generate for the SMEF and the MOI.

Table 27: Determinants of the distance from the estimated stochastic production frontier

Model	Unstandardized Coefficients	t
	B	
(Constant)	0.526	0.749
Ln Age	-0.153	-1.163
Ln Education	-0.209	1.014
Ln White color worker experience	-7.60E-02	-0.947
Cluster	0.234	1.210
Bank loan dumy	-0.266	-1.116
Ln Fk/labour	5.3222E-02	0.760
Ln APP	-0.107*	-1.831
Chittagong	-0.300	-1.232
R-square	0.092	

Source: SMEF Survey, 2008

Note: One asterisk shown in the column labeled 'T-stat' shows the variable is significant at 5% error probability level; two shows significance at 10% error probability level

Chapter 6

Sample Survey results about access to finance in the light engineering industry

6.1 Introduction

Before we could present an analysis of the access to finance on the part of SMEs, we need a framework of discussion as to what we shall mean by access to finance regime? The regime typically involves the following narrative variables, namely, (1) size structure of loans; (2) structure of interest rates.[91] . We recognize two categories of loan---namely, institutional, non-institutional and trade credit.[92] The issue remains that the coverage of the data relating to institutional and non-institutional loans is better compared with trade credit. That is why we also present weighted average using two alternative bases. One of these bases only takes into account institutional and non-institutional loans. Trade credit is missing from the other. We present information concerning loan sizes with respect to three borrower situations, namely, institutional loans; non-institutional loans and trade-credit.

Structure of loan sizes

Table 28 presents results concerning several indicator variables cited above, namely, the proportion of establishments with access to institutional loans, average loan size and average interest rates. For each category of loans types, we also present information about interest rate structures.

Loan sizes' structure of bank loans

Among the establishments of the Light Engineering Sector of Bangladesh, the proportion that has a loan from at least one scheduled bank or leasing company is 25%---in all, there have been 35 cases of a firm taking a bank. The average bank loan size in this industry is Tk. 0.606 million. The average maturity of the loans in this sector is 3 years. Those are the averages. However, there is a very significant dispersion of both loan sizes and interest rates around these average with regard to firm size variable. The following table clearly shows that as compared with MiSmall establishments, medium and large establishments (represented by MeLarge establishments) have significantly larger bank loan contracts---Tk. 812.7 thousand *versus* Tk. 432.9 thousand[93]. That difference is statistically highly significant: after all, the average provisioning of bank loan for the MeLarge is almost twice as large as for MiSmall establishments. More important, MeLarge establishments are found to be out-lent *versus* MiSmall establishments by a factor of 2.36:1, when we take the entire sample into account. Significantly enough, as compared with MiSmall establishments who are dwarfed

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[91] One could also argue that (1) structure of outstanding loans with respect to the value of fixed collaterals; (2) the age-structure of arrearages ought also to be included in the definition of finance regime. We agree completely. We made an effort to also collect data on outstanding loan values and their age structure. It is in the area of access to finance that the degree of cooperation of our respondents with the survey was the most lackadaisical, if not outright adversarial. In a very large proportion of cases, the respondents simply refused to discuss the issue of 'outstanding loans' and 'age '

[92] Trade credit is also recognized in our data. For three of our sectors, respondents cooperated more than in others as far as interest rates on trade credits. For the sectors where the data were the most inclusive, trade credit averaged roughly at 33.3% annually. It is this average that we have used for the other three sectors where data was not available.

[93] These averages are only calculated based on cases where a loan contract was issued to the sample observation.

in terms of the loan size, the rates of interests paid by MeLarge establishments are statistically the same. The evidence is therefore clear that MiSmall establishments are somewhat under-banked compared with MeLarge establishments.[94]

The prominence of credit on the books of account of SMEs is important not for academic reason. It is for an entirely practical reason. And the reason is that the amount of credit is a major determinant of the per-worker output in the industry, even after controlling for several relevant variables. That is why it is important to profile both the MiSmall and MeLarge establishments in terms of the extent to which their credit "requirements" for access to finance at affordable rates of interest are acceded to. Entrepreneurs in the MiSmall category are clearly credit-constrained. Whereas their working capita needs in the study year happen to be on average Tk. 2500000, their availment of debt finance happens only to be the size of Tk. 800000. That is to say, they have to depend upon trade credit or informal credit availment to the extent of Tk. 1700000.

Table 28: Structure of institutional loans taken by establishments in Light Engineering Industries, 2006/07

(Tk. 000s)

Farm status	No. of bank loan taker	% of cases with bank loan	Average loan size of firms that received bank loans	Average loan size taking all firms	No. of leasing company loans	% of interest for bank loan
Micro	3	7.87	1833.33	144.74	0	20.33
Small	16	18.39	3837.5	705.75	1	19.88
Medium	8	47.06	6650	3129.41	0	19.78
Large	0	0	0	0	0	0
Mi small	19	15.2	3521.05	535.20	0	19.95
Melarge	8	32	6650	2128	0	19.78
All	27	18	4448.15	800.67	0	19.76

Source: SMEF Survey, 2008

Among the establishments of the light engineeringindustry of Bangladesh, the proportion that has a loan from at least one non-institutional loan is only 2.14%---in all, there have been 3 cases of a firm taking a non-institutional loan. The average loan size of a non-institutional loan contract is Tk. 27.1 thousand. The light engineeringindustry does not have much exposure to non-institutional credit. One reason that this is true is that the pioneers in this particular sector tapped a quite rich artery of what the industry itself called 'quick money'. The firms that entered into this industry early on were typically flush with liquidity. Consequently, the entrepreneurs in this sector don't really have much of a demand for high-cost non-institutional credit.

[94] We have put this conclusion a little euphemistically. It is quite correct to say that the degree and the provisioning of institutional credit by medium or large establishments would be understated to a greater degree compared with MiSmall establishments. For a larger proportion of the cases, the MeLarge establishments were characterized by non-response to questions concerning the fact and the extent of bank loans or loans from leasing companies.

Table 29: Structure of non-institutional loans by establishments in Light Engineering Industries, 2006/07

(Tk. 000s)

Firm size	No. of non-Institutional loans taken	% of cases with loans	Average loan size of firms that received loans	Average loan size taking all firms	% of interest for bank loan
Micro	1	2.63	100	2.63	10
Small	5	5.74	322	18.51	0
Medium	1	5.88	300	17.65	0
Large	0	0	0	0	0
Mi small	6	4.8	285	13.68	1.67
Melarge	1	4	300	12	0
All	7	4.67	287.14	13.40	1.42

Source: SMEF Survey, 2008

Table 30: Structure of trade credit availed by establishments in Light Engineering Industries, 2006/07

Firm size	No. of trade credit taker	% of cases with trade credit	Average loan size of firms that received loans	Average loan size taking all firms	% of interest for trade credit
Micro	2	5.26	903	47.53	24
Small	21	24.14	5118.38	1235.47	19.43
Medium	9	52.94	9893.79	5237.89	16.78
Large	0	0	0	0	0
MiSmall	23	18.4	4751.83	874.34	19.83
MeLarge	9	36	9893.79	3561.76	16.78
All	32	21.33	6198.00	1586.69	18.97

Source: SMEF Survey, 2008

Among the establishments of the light engineeringindustry of Bangladesh, the proportion that has a loan from at least one non-institutional loan is only 32.86%---in all, there have been 46 cases of a firm availing of trade credit. The average loan size of a trade credit deal is Tk. 990.62 thousand. That said, the size of trade credit per establishment is Tk. 325.5 thousand. The light engineeringindustry has a good deal of exposure to trade credit.

Table 31: Weighted average Interest rates (% per year)

Firm size classes	Weighted average interest rate of institutional and non-institutional loans	Weighted average interest rate of institutional,non-institutional loans and trade credit
Micro	19.79	21.13
Small	18.34	18.95
Medium	18.93	17.67
Large	0	0
MiSmall	18.58	19.27
MeLarge	18.93	17.67
All firms	18.65	18.83

Source: SMEF Survey, 2008

Capital earns a return because rational economics agents have a positive time preference: consumption today is preferred to consumption tomorrow. Capital intrinsically involves the sacrifice of consumption, for which the contributor of capital will demand a reward. In business, capital in use comes in two forms---fixed capital and working capital. The two intrinsically differ in the treatment of time each is imbued with. While working capital is about the capital that typically has a life of one year, fixed capital will involve sacrifice of consumption over many years. Both forms of capital are valuable, and that is why both are needed by enterprises.

Financial requirements of firms are of two major categories. The first is about the need for long-term finance, typically required by enterprises as they go about setting up investment projects with life-times exceeding many years. Typically, this is called 'the need for term loan'. And then there is the need for short-term loan, defined to extend to maturities of up to a year. Medium-term loans are defined to extent to maturities of between 12 months and 36 months. In this report, we mainly concentrate on loans with maturities of up to 12 months.

Because the rates of interest in Bangladesh are among the highest in Asia, and the chill from global competition, including from Asia's two humongously large economies, among the greatest, the demand for long-term loans is relatively small. The universe for such loans is populated largely by well-capitalized 'corporate' financing clients whose capacity to service such loans is a 'no-brainer'. Commercial banks avidly seek the custom of such tier-one customers, sometimes offering attractive interest rate discounts. Banks do actively take into account the fact that such large corporate customers generate much more business by way of service charges based on their import trade and L/C margin and the like. They stand to gain more in the swings than lose in the roundabouts.

There is also some *a priori* evidence that short-term loans are more quick-disbursing and account for a majority of the credit "requirements" of the SMEs in Bangladesh. Some evidence in support of this can be seen in the work of Chowdhury and Rahman (2008). When the Bangladesh Bank and the IDA capitalized an window for funding the Small Enterprise Fund (SEF) based on a re-finance --- as opposed to pre-financing --- scheme, traders applying for short-term loans accounted for by far the largest percentage of the disbursements out of this fund (Chowdhury and Miah, 2006; Chowdhury and Rahman, 2008). The assertion is also supported by data available from the Bangladesh Bank, relating to the distribution of advances with respect to loan maturities. To quote: "short-terminism seems to be the order of the day (Chowdhury and Miah, 2006)." Working capital requirements thus happen to be a key vantage-point for appraising a financing industry from the perspective of SMEs. It has to suffice for the moment as the basis for the presentation of our results about the extent to which access to finance is the binding constraint for SMEs in Bangladesh.
The following few paragraphs are about how we measured the quantum of fixed and working capital that are needed by enterprises. We start with fixed capital requirements. But first we need to share a few caveats with you.

Capital machinery is bought based on a production plan that extends over many years of life. In the interim, of course, the level of demand for the output of the industry in question will be subject to all manners of fluctuations, ranging between those associated with trend variables, cyclical and seasonal factors, even random fluctuations. The typical situation of a manufacturing establishment in Bangladesh is where it reports that capacity for production --- and this reflects the use of fixed capital in the business --- is less than fully utilized. Capacity utilization the size of 60 or 70% of economic rated capacity, which is accurately characteristic of the particular industry under study in this sector report, is emblematic of a situation of excess supply of fixed capital. In a land that suffers from conditions of scarcity of capital, a spectacle of excess fixed capital is itself suggestive that it is the supply of fixed capital requirements is not the dominant problem.

There is also an intrinsic difficulty that crops up in assessing whether the requirement of fixed capital of a particular class of entrepreneurs is typically unmet. The point is that whether the supply of fixed capital financing is constricting is revealed at the first instance to the entrepreneur that, with a business plan in the attaché case, is seeking to raise start-up capital. The issue is that such an entrepreneur was almost beyond the pale for this, or for that matter for any survey such as this, simply because of the methodological requirement for a sample frame of *existing* enterprises. There is no accessible list frame of entrepreneurs having credible business plans for which capital is sought.

Our answer to this problem has been to solicit information about the relative importance of equity and retained earnings versus debt as sources of finance at start-up of the sample establishments. And we learn that by far the greatest percentage of the sample establishments have had to start up with equity infusions or with retained earnings. The following table presents the results of this exercise.

Table 32: Average equity-debt ratio in Light Engineering Industries in Bangladesh

Firm size classes	Percentage of equity	Percentage of debt	Debt Equity ratio
Micro	90.49	9.50	90:10
Small	89.47	10.53	89:11
Medium	82.75	17.25	83:17
Large	93.18	6.82	93:7
MiSmall	89.78	10.22	90:10
MeLarge	86.23	13.77	86:14
All firms	89.19	10.80	89:11

Source: SMEF Survey, 2008

The one compelling finding that arises from this table is about the role of a conspicuous minority to which debt in general has been assigned in this table. Overall, only about 17% of the capital raised in the Light Engineering Sector of Bangladesh has been in the way of debt.[95] Suffice it for the moment to say that the long-term, start-up, capital is in critically short supply.[96]

[95] The only other recent study to have offered any comparable insight to the one under discussion here is from the World Bank Group's Investment Climate Survey 2002. That sample was skewed towards large establishments, whereas our own sample is 'self-weighted'. Unfortunately, given the fairly highly aggregative way in which that data has been presented, it is not really practicable to get a handle on industry-specific results. It is not unusual therefore that the ICS-2002 reported a much higher prominence to debt as a source of finance. The estimate supported by the survey carried out by this team is much more representative of the broad swathe of establishments actually existing in Bangladesh.

[96] Alternatively, whether we ought to say that the demand for debt as a source of finance has been woefully small is moot too. After it takes two to tango, and in an analysis of one of the markets, such as here, there is demand as well supply to account for. Bangladesh's long-term interest rates have for long been high, especially the privatization of the banks. Over the life times of our sample observations, the interest rates for the term-lending loans have consistently been high. It is therefore no wonder that the proportionate prominence of debt as a source of finance is what it is, ie very very low.

The rest of this discussion will seek to concentrate on working capital capita finance in assessing the gaps in the performance of the markets for capital.

Assessing the state of the provisioning of working capital finance

In an article published in 1964, Professor Amartya Sen, now of Harvard University, formulated how one can get at the working capital needs of businesses. Working capital, he argued, comprises largely of five sub-components. They are (i) value of input inventories; (ii) value of work-in-progress; (iii) value of output inventories; (iv) average value of the receivables[97]; and (v) the amount of cash on hand, which generates the equivalent of 'convenience yield' of having the cash resources to prevent any situation that is akin to 'stock-outs' or 'cash-outs'. Being out of cash resources will be tantamount to doing without, and will thus be a potentially costly situation.

Needs for working capital finance closely correspond to the concept of capacity utilization. Accurate assessment of needs for any resources can only be gleaned from a prior assessment of the 'true economic' capacity, not from the 'rated engineering capacity'. Without minimizing the importance of the engineering rated capacity to industrial or production engineers, the fact remains that such engineering capacities need not closely correspond to what is, for cash-gain-maximizing firms, economically rational to produce. Before we can talk about the requirements for finance, we have to assess the economically relevant capacities of the establishments in the Light Engineering Sector.

Respondents were asked about how many days in a year do they typically want their businesses to stay open. As well, when answering our question about the level of production achieved, we had also solicited from the respondents information about the utilization of their capacities. We have now a choice between two measures of economic capacity, namely, the output equivalent of the number of days of intended operation cited by the respondent; and the capacity directly cited by the respondents. In every case, we choose the lower of the two values.

The following table presents the need or the requirement of access to finance from the perspective of the entrepreneurs themselves.

Table 33: Working capital provisioning per establishment

(Taka 000s)

Firm size class	Raw material inventories	Finished-goods inventories	Transaction demand for cash resources(cash in hand)	Net Receivables in the market	Value of work in progress	Total working capital
Micro	149.71	55.93	85.21	255.94	13.33	560.12
Small	616.02	1519.66	357.93	1592.56	51.02	4137.19
Medium	1601.03	1756.94	593.21	2637.81	0	6588.99
Large	8556.88	8385.75	957.14	4142.86	0	22042.63
MiSmall	474.26	1074.68	278.39	1172.48	41.48	3041.29
MeLarge	3826.90	3878.16	714.52	3095.87	0	11515.45
All firms	1033.03	1541.93	343.34	1518.09	35.13	4471.52

Source: SMEF Survey, 2008

[97] Receivables will no doubt correspond to different 'time-profiles'. There is instinctively a need for an 'averaging' in a situation like this. We derive this value while dividing the reported value of receivables by two: the average value of the receivable would naturally be an average of the 'longest' due and the 'youngest' due.

We estimate working capital requirement based on firms' attainment of its capacity. Our questionnaire had solicited information about the percentage capacity utilization achieved. Before proceeding any further, it is worth asking if it at all makes sense that we might try to envisage a capacity for each of the products.

We are going to argue that it makes perfect sense. Where firms are mono-product firms, evaluation of capacity is typically a straight-forward matter: one merely divides the rated *economic* capacity of the firm, evaluated in terms of the one product that it manufactures by the output, again measured similarly, and multiplied by a hundred.[98] Where, as is presently the case, multi-product firms predominate numerically, it is necessary to help respondents define the very concept of capacity so as to accommodate the plurality of the cash-gain-maximizing output-mix of firms. This has been done presently.

Table presents the proportions of revenue generated by each of the sample observation's main products. We use these percentage (or relative shares) as weights in migrating from product-specific capacity utilization estimates into an weighted average capacity utilization estimate. This is presented in Table- .It is these findings that we need to discuss more fully.

We find that the weighted average capacity utilization rises in a tidy monotonic fashion across the four size classes. At 51%, the weighted capacity utilization of the micro segment is the lowest. The small establishments do considerably better, at 64%. Medium and large establishments score 68% and 73%. MeLarge establishments out-achieve MiSmall establishments by a clear 7 percentage point advantage.

We'd argue that the achievement shortfall in terms of capacity utilization is itself a measure of the extent of the deficit in the scale of the provisioning of working capital that sample firms have suffered from. On the whole, we would say that the light engineeringindustry is characterized by a shortfall in its working capital provisioning of some 35%. However, MiSmall establishments characterized by a shortfall in its working capital provisioning of some 38%, whereas the MeLarge establishments are characterized by a shortfall in its working capital provisioning of some 31%.

[98] Note that we are using the concept of economic capacity, and not *rated engineering* capacity. Engineering capacities in the nature of things overstate economic capacities, because they fail to factor in *economic* or *business* or *regulatory* constraints which are *force mejeure* for the firms. The firms can't relax or mitigate these constraints. Economic constraints thus always lie below engineering constraints. In the approach we made in our own measurement of capacities at the level of individual products, we were diligent in steering the conversation with the entrepreneur such that the benchmark captured for purposes of the calculation of capacity utilization was economic capacity. A second issue was about how we dealt with the issue of plant, machinery, and equipment being fungible, ie capable of being used in tandem in the production of more than just one output. This was a real problem in that many, indeed a clear majority, among our sample observations are multi-product firms. It would be quite natural for the output mix that would maximize profitability to be treated as among the factors that determine the *economic capacities* for each of the products under study. Our survey staff tried their utmost to convey these vibes to the respondents before asking the question about product-specific capacities utilized.

Chapter 7

Major Products, Cost of Production and marketing Chain of LEIs Products

Table-34: Relative Weight of Various major products in the Light Engineering Industries of Bangladesh

(% of Revenue from different products)

Farm SizeClasses	Repair	Utensils	Grill	Wire	Dyes	Others	Total
Micro	62.69	0	5.72	0	3.78	27.81	100
Small	11.94	53.56	0.83	9.75	0	23.93	100
Med	4.49	13.71	0	0	0	81.80	100
Large	4.07	68.70	0	14.47	0	12.76	100
Mismall	14.81	50.53	1.10	9.20	0.21	24.15	100
Melarge	4.29	39.81	0	6.87	0	49.03	100
All	10.29	45.92	0.63	8.20	0.12	34.84	100

Source: SMEF Survey, 2008

Table-35: Weighted average capacity utilization in the Light Engineering Industries of Bangladesh

Farmsize classes	Percentage of utilization of capacity						Weighted avg. capacity utilization ratio
	Sl. No of productivity			Avg. revenue from			
	Product 1	Product 2	Product 3	Product 1	Product 2	Product 3	
Micro	67.24	80.83	70	86.98	9.53	3.49	68.63
Small	67.21	68.89	71.75	83.63	10.54	5.83	67.65
Medium	69.41	76.25	88.33	71.42	25.59	2.99	71.73
Large	74.38	65	70	78.17	14.05	7.78	72.72
Mismall	67.22	72.56	71.4	84.65	10.23	5.12	67.98
Melarge	71	74.64	83.75	73.58	21.89	4.52	72.37
All	67.85	73.11	73.46	82.80	12.18	5.02	68.77

Source: SMEF Survey, 2008

Comprehensive understanding of the marketing chain

Marketing is the business of connecting consumers with manufacturers. This involves transporting a commodity between places, storing it between periods and changing its form to make it fit for human consumption. In all economies, this is a vital function to perform efficiently, ie. At least possible resource costs. Economies, and markets, differ in terms of how well the marketing function is performed. Marketing is efficiently performed when the marketing agents charge keen rates for the use of their resources---time, money, skills, vehicles or fixtures, assets, godowns and risk-bearing---and earn competitive profites. The consumer pays a price that is deemed closely related to the resource costs of supplying to him the commodity in the quantity and at the place and time desired. The manufacturer receives a price that keenly compensates him for the use of the resources up to that stage of production. Understanding how competitively a market performs involves looking at the costs of and normal returns to marketing. On the cost side, we look at the cost of production, and at the cost of spatial arbitrage and at the cost of marketing. Finally, we look at the wholesale and retail margins of benchmark versions of products produced by sample observations covered by us in the survey.

Cost of production

Table 36 below reports on the average cost of production in the establishments in the light engineering industry of Bangladesh.

Table 36: Average cost of production of final produce in Light Engineering Industries of Bangladesh (Taka per unit)

Firm sizes	Cost of production per establishment (Tk. 000s)	Total physical output	Cost of production per unit of output .
Micro	1385.02	4.62	1696.00
Small	14787.12	77.79	1766.47
Medium	32615.75	192.59	1583.11
Large	55876.47	390.27	2601.02
MiSmall	10712.88	55.54	1745.05
MeLarge	37381.02	255.85	1902.97
All firms	19381.23	88.92	2747.89

Source: SMEF Survey, 2008

Before proceeding any further, we have to note that these average costs of production cover a relatively large collection of products. These averages in the table are weighted averages, arrived at by dividing average outlay per establishment across size classes by the corresponding average physical volume of production. Cost of production of micro establishments in the sample is Tk. 1150.7, as opposed to Tk. 1574.3 for small establishments. Likewise, the cost of production of medium establishments is Tk. 1923.2, *versus* as opposed to Tk. 2152.5 for large establishments.
Naturally enough, retail prices differ very significantly among various size classes. Medium and large (MeLarge) firms significantly outprice micro and small (MiSmall) establishments. Clearly, the MeLarge establishments are selling things on a premium, compared to MiSmall establishments. This means that the marketing margin systematically differ between small establishments, and their 'comparators' across the small-large divide. And one of the more abiding images of this crop of research results is about the divergence between the small and non-small establishments.
The following table reports on the marketing margin among the establishments on our sample. Marketing margin for the establishments as a whole is defined as follows:

$$Mi \ =$$

Where mi happens to be the enterprise-specific market margin, Pr is the price at the retail level, Pa is the price at the artisan's level, and wi's are the weights, based on revenue, each product has in the product-mix.

As expected, we find a statistically significant difference between the MiSmall and MeLarge establishments in terms of measured marketing margin. Whereas the weighted average marketing margin of the MiSmall establishments is found to be 18% only, the corresponding number for the MeLarge establishments is found to be as high 28%---a clear ten percentage point difference. Getting at the product-specific estimates of the marketing margin, we get at a much finer disaggregation of our results.

Table 37: Average retail prices of five major categories of final produce in Light Engineering Industries of Bangladesh (Taka per unit)

Average price of different products

Farm Size Classes	Repair	Utensils	Grill	Wire	Dyes
Micro	22607.74	--	10000	--	17996.5
Small	9998.46	270933.33	15375	60000	300000
Med	101333.5	124500	--	--	--
Large	50000	236666.67	--	44500	--
Mismall	15708.32	270933.33	14300	60000	74397.2
Melarge	88500.13	191800	--	44500	--
All	20816.52	251150	14300	73888.89	74397.2

Note: The unit for 'repaid' and 'dyes' is the number of pieces, whereas the unit for utensils, grill and wire happens to be tonne.

Source: SMEF Survey, 2008

The foregoing table shows that, on an average, these five flagship products of the light engineering industry retail, respectively, at Tk. 20816 per piece,Tk. 251150 per tonne, Tk. 14300 per tonne, Tk. 73889 per tonne and Tk. 74397 per piece.

Reliance on own sales outlets versus distributors versus commissioned sales agents

The following subsection secures an explanation of the different degrees of marketing strategies of the sample observations based on comparing their reliance on each or all of the three alternative options cited in the foregoing.

Indeed, MeLarge players derive a much greater proportion of their revenue from having their own sales outlets. Whereas the MeLarge players derive as much as 75% of their revenue from their own sales outlets, the same is true for only 35% of their revenues for the MiSmall players. The MeLarge players don't have almost anything to do with the wholesale and retain channels at all, the MiSmall players have a great deal of connection with the wholesaler-retailer channels. The intuition behind this result is self-evident. The MeLarge players are better capitalized, and therefore abler to afford the very sizeable down-payments necessary to be made preparatory to acquiring commercial space in good locations in the city.

The marketing margin for MeLarge players is also larger compared with MiSmall players because of yet another reason. And that reason is about the fact that the former makes an effort to produce goods representing on average a better-quality product. The clear evidence for this can be had from examining the unit prices of the goods they sell. The average prices of their goods is clearly statistically significant and higher compared with MiSmall players' average prices.

MiSmall players appear to be confined to using the services only of the traditional, top-down marketing network approach. That is, they most use the market channels of wholesalers and retailers. And being dependent upon this traditional market channels translates into having to depend upon channels that demand a great deal of trade credits to be provided.

Decomposing the relative importance of exports *versus* domestic marketing

The following table presents an information concerning the comparative reliance of the sample establishments upon domestic sales versus exports. It is found that no percentage at all of the output of the light engineeringindustry is exported. And this does not change whether we consider MiSmall or MeLarge class of players.

Table 38: Comparative prominence of export-oriented versus domestically-marketed goods in the Light Engineering Industries (Per cent)

Firm size class	% of revenue derived from		
	Sales domestically	Exports	Total
Micro	100	0	100
Small	100	0	100
Medium	100	0	100
Large	100	0	100
MiSmall	100	0	100
MeLarge	100	0	100
All firms	100	0	100

Source: SMEF Survey, 2008

Overall, fifty-seven percent of the revenue in this industry are generated from exporting, and the residual of 43% are generated from domestic sales. That said, the survey found a statistically significant difference between MiSmall and MeLarge establishments in terms of the exposure to the export markets---61.7% *versus* 50.6%.

Table 39: Number of principal customers buying from sample observations in the Light Engineering Industries (Per cent)

Firm size class	No. of principal customers	Of exports			Average unit price of exports ($ US)
		% exported directly, by oneself	% exported through others	% exported unofficially	
Micro	0	0	0	0	0
Small	0	0	0	0	0
Medium	0	0	0	0	0
Larg	0	0	0	0	0
MiSmall	0	0	0	0	0
MeLarge	0	0	0	0	0
All firms	0	0	0	0	0

Source: SMEF Survey, 2008

The tab le shows that average number of principal customers per establishment on this sample is 9.1. There isn't a whole lot of difference between MiSmall and MeLarge establishments in terms of the number of principal customers. As well, own-account exports and exporting through one's agents split on a 44:44 basis. We also find that some 11.6% of the exports are effected using the so-called 'unofficial' channels.

Table 40: Market channels for domestic sales in the Light Engineering Industries (Percent)

Firm size class	% sold domestically through wholesalers	% sold domestically through own outlets	% sold domestically through agents	% sold domestically through others
Micro	16.32	0	2.11	81.57
Small	16.32	4.43	1.15	78.10
Medium	37.06	0	0	62.94
Large	23.13	0	1.87	75
MiSmall	16.32	3.08	1.44	79.16
MeLarge	32.60	0	0.60	66.80
All firms	19.03	2.57	1.3	77.1

Source: SMEF Survey, 2008

Table 38 reports results about the pattern of domestic marketing using various market channels. Overall, 'own outlets' is the marketing channel of choice, and accounts for 34.4% of all output domestically marketed. Overall, the next most important market channel happen to be 'the marketing through miscellaneous channels'. Important differences however lie behind these 'average' figures. The percentage of domestic output marketed using own-outlets of the MeLarge establishments relative to MiSmall split almost on a two to one ratio. The obverse of this is that the MiSmall establishments out-depend the MeLarge establishments by about 10 percentage points when it comes to relying upon wholesalers. And this result is perfectly intuitive: opening own outlets is not within everybody's wherewithals, or capacities. Typically, opening one's own outlets requires a good deal of additional capital. We have already seen that access to finance involves certain egregious asymmetries across the MiSmall *versus* MeLarge class of establishments. And having a secure line of credit is of critical importance when it comes to determining whether a firm feels bold enough to launch into own-account marketing. The MiSmall establishments are much deeply capitalized compared with MeLarge, and therefore rely proportionately much less upon direct outlets. Instead, they depend more upon wholesalers.

MeLarge establishments depend more on own-account outlets in order to build their own customer-service brand loyalty. It is not always prudent to depend upon wholesalers building brand loyalty is one's objective. A second reason why manufacturers are not really enamoured of wholesellers is that the latter demand --- and get ---suppliers' credit. Table 39 presents results relating to the terms and conditions under which wholesalers do their business with manufacturers. Several results rate a mention here. Firstly, suppliers' credit has to be provided on more than three-fifths of the manufacturing throughput passing through wholesalers. Nor are the payments of the wholesalers are impeccable: at the years' end, as much as 16-17% of the disbursements to wholesalers remained unpaid, due to be collected. On an average, manufacturers are owned a large verage sum of Tk. 855 thousand. Small wonder, MeLarge firms are migrating out of the orbit of the commercial influence of their wholesalers.

Table 41: Wholesaling market channels in the Light Engineering Industries (Per cent)

Firm size class	Number of wholesalers	% to be sold on credit	Average tenure for the credit	% premium charged	% that remains unpaid for at end of year
Micro	1.08	14.59	3	1.62	4.51
Small	5.05	14.43	23.44	0.57	5.36
Medium	3.76	76.18	76.29	1.53	7.06
Large	11.29	21.25	12.5	0	5
MiSmall	3.84	14.48	17.34	0.89	5.10
MeLarge	5.96	58.6	55.88	1.04	6.40
All firms	4.18	21.88	23.81	0.91	5.32

Source: SMEF Survey, 2008

Table 42: Direct sales outlets channels in the Light Engineering Industries (Per cent)

Firm size class	Total sales Outlet	Employees No.	Administrative cost.(in taka thousand)	Wages per month	% Rejected
Micro	0	0	0	0	0
Small	0.25	0.89	38.42	1149.43	0.02
Medium	0	0	0	0	0
Large	0.25	1.38	37.5	750	0.25
MiSmall	0.18	0.62	26.74	800	0.02
MeLarge	0.08	0.44	12	240	0.08
All firms	0.16	0.59	24.28	706.67	0.03

Source: SMEF Survey, 2008

Table 40 shows several things. Firstly, overall firms in the light engineeringindustry man 3.27 own-account sales outlets . MeLarge establishments out-retain MiSmall establishments by a factor of almost 50%---3.74 outlets *versus* 2.50. Secondly, the average size of a direct sales outlet maintained by the MeLarge establishments in terms of the number of workers per sales outlet is more than three times as large as compared with MiSmall establishments (4.74 *versus* 1.34 workers hired per sales outlet).

Tables 41 and 42 are about the economics of the commissioned agents and about the terms under which manufacturers' transactions with them take place.

Table 43: Commissioned agents' channels in the Light Engineering Industries (Per cent)

Firm size class	Total Agent	Total wages per months(taka thousand)	Per head Com.in per thousand units	Total Com.per year (in taka thousand)	% rejected
Micro	0.18	0	1.58	1.89	0
Small	0.11	0	1.15	3.45	0
Medium	0	0	0	0	0
Large	0.5	0	25	12.5	0.5
MiSmall	0.14	0	1.28	2.98	0
MeLarge	0.16	0	8	4	0.16
All firms	0.14	0	2.4	9.15	0.03

Source: SMEF Survey, 2008

The drivers of unit costs of production

Unit costs are defined as the total cost of production divided by the rate of the establishment's output. The following budget line items have been added up while getting at total cost of production:
Cost of raw materials;
Cost of other materials (such as fuel, lubricants, dyes and chemicals, packing materials)
Spares parts, and cost of preparing moulds etc.
Repair and maintenance, etc
Financing costs
Office supplies
Communication, storage, and transportations
Wages and salaries
All kinds of utility expenses
Advertizement expenses
Marketing outlay
Rentals of various kinds
Commercial expenses arising in connection with foreign trade
Miscellaneous expenses

Table 44: Cost of production per establishment in the Light Engineering Industries (Tk.000s)

Firm size class	Raw materials costs	Parts & components, repair & maintenance	Wages	Other expenses	Total cost of production	Overall cost of production per unit of output (Tk)
Micro	1064.92	2.65	215.95	101.52	1385.04	1696.00
Small	13385.55	27.39	841.54	532.64	14787.12	1766.47
Medium	26911.18	417.35	3815.77	1471.46	32615.76	1583.11
Large	46957.72	37.5	8000	881.25	55876.47	2601.02
MiSmall	9640.08	19.87	651.36	401.58	10712.89	1745.05
MeLarge	30007.91	295.8	5794.72	1282.59	37381.02	1902.97
All firms	13034.71	65.86	1508.59	548.41	15157.57	2747.89

Source: SMEF Survey, 2008

Table 45: Average expenses (Taka thousand)

Farmsize classes	Raw mat. cost	Mainta-inance cost	Wages	All types of utility cost	Ad / marketing cost	Lease /rental cost	Commercial cost	Bank interest charges
Micro	1064.92	2.65	215.95	44.63	0	47.11	0	9.78
Small	13385.55	27.39	841.54	271.48	26.97	111.12	0	123.07
Medium	26911.18	417.35	3815.77	582.05	47.65	263.65	0	578.11
Large	46957.72	37.5	10000	412.25	17.5	201.5	0	250
MiSmall	9640.08	19.87	651.36	202.52	18.77	91.66	0	88.63
MeLarge	30007.91	295.8	5794.72	527.71	38	243.76	0	473.12
All	13034.71	65.86	1508.59	256.72	21.98	117.00	0	152.71

Source: SMEF Survey, 2008

Table 46: Percentage of expenses of total cost

Farmsize classes	Raw mat. cost	Mainta-inance cost	Wages	All types of utility cost	Ad / marketing cost	Lease /rental cost	Commercial cost	Bank interest charges
Micro	76.89	0.19	15.59	3.22	0.00	3.40	0	0.71
Small	90.52	0.19	5.69	1.84	0.18	0.75	0	0.83
Medium	82.51	1.28	11.70	1.78	0.15	0.81	0	1.77
Large	84.04	0.07	14.32	0.74	0.03	0.36	0	0.45
MiSmall	89.99	0.19	6.08	1.89	0.18	0.86	0	0.83
MeLarge	80.28	0.79	15.50	1.41	0.10	0.65	0	1.27
All	85.99	0.43	9.95	1.69	0.15	0.77	0	1.01

Source: SMEF Survey, 2008

Table 44 reports costs of production per establishment across the firm size classes. In the last column, the table also then reports on average cost of production. The average cost of production is clearly a monotonically rising function across the four size classes of the establishments in this industry.

Fitting Cost Functions in the Light Engineering Industries of Bangladesh

Policy-making for pro-poor growth will often put a premium on being able to understand the drivers of unit costs. The point here to note is that cost competitiveness is good for competitive performance. And that being able to lower one's average costs is good for one's survival in the long run. As well, unit costs are the metric that everyone, especially including the competitors in the emerging industrial powerhouses in the Asia region, watches intently. Especially in China and India, the world's largest manufacturing juggernauts are amassing latest technologies, skills and computer-aided manufacturing gadgetries, helping such countries become ready receptors of the massive surge in demand for their products which are now in the process of being unleashed. Therefore, aggressive monitoring and mentoring of costs is imperative if firms have any ambition at all for survival, and growth, in a feverishly competitive 'global village' that the world of commerce and industry have managed to become in the last four decades.

Competitive cost analysis is important for a number of reasons. While financial accountants concern themselves mainly with elements of costs --- and this concern is also importantly shared by the management --- it is however the cost drivers that are of far greater operational significance. The literature suggests that cost drivers essentially fall into four categories, and they are (i) design-related costs; (ii) facility-related costs; (iii) geography-related costs; and finally (iv) operation-related costs. Before proceeding any further, it is moot to enter just a few sentences each with respect to each of these four categories of cost drivers.

Design-related cost drivers: Because a product owes itself to a design process, it is imperative to get the design-related costs of alternative specifications right. This is necessary so that an apples-to-apples comparison is possible among alternative product designs that offer comparable functionalities. It is important in doing to start off from an well-agreed definition of what is the goal of the design process. We mean to say that the same set of functionalities can be achieved with or without offering *additional desirable capabilities*. Such design-stage add-ons will always come on with cost additionally.

Facility-related cost drivers: Some production technologies are such that it is advantageous to scale their output up, because larger scales of output ensue economies of scale, which smaller scales of output don't. This consideration makes it imperative to treat the scale of output, or the technologically-determined size of the plant a facility-related cost driver that we need to model the effect of. As well, at times, the economies of scale are not so much technologically datum as the derivative of some economic incentives, for instance the fact that volume discounts may be available on input purchases, and that large scales of output are associated with large volumes of input purchases. That is, there are economies of procurement and marketing. If used or rented equipment are cost-effective relative to new equipment, the recycling of used or rented equipment is a desirable cost driver. If frequent power outages render investment on large capacity electricity generators cost-effective, the shrewdness in the process of locating the least-cost generation technology is likely a positive cost driver.

Geography-related cost drivers: Spatial pockets of relatively high wages, or high input prices exist in every country. Rental rates are relatively high in certain clusters than in others. The down-payments that need to be made in the swankiest parts of the city in order to lease 'showroom' or 'display centers' tend to be much higher than in boorish parts of town. The point is that geography can be destiny in certain kinds of businesses. And yet geography can be an important competitive cost motivator.

Operation-related cost drivers: It is increasingly recognized that manufacturing operations can be more or less mean. Japanese manufacturing has famously introduced lean manufacturing, or the just-in-time (JIT) manufacturing. The extent of specialized training of the Managing Director will be an operational cost driver, as will whether the establishment is located on or near the all-weather highway. As well, the ratio of the number of production workers to the number of mid-level supervisory and managerial workers will also shape up as yet another operational cost driver. Moreover, percentage reliance of the establishment on imported raw materials (to be evaluated using the ratio of imported parts and components in the total outlay on raw materials) will be utilized as yet another operational cost driver.

The really important question is what are the drivers of the unit cost of production. To answer that question, we shall need to consider a number of competitive cost drivers.

The most basic form of the cost function is the one in which the unit cost is simply modeled as a function of the rate of output. At times, in order to test for any non-linearity in the cost surface, a quadratic terms is also typically factored in. Sometimes, even a cubic term is also introduced into such a cost equation. Under these circumstances, the cost function has the following appearance:

$$Ln© = c_0 + c_1*\ln(Q) + c_2*\ln^2 Q + c_3 \ln^3(Q) + c_i \Sigma X_i$$

Where C = Average cost of production
Q = The rate of output
c_0, c_1, c_2 and c_3 are coefficients of the cost function to be estimated;
'ln' is the code of natural log;
and X is a matrix of a number of explanatory, shifter, variables.

Such a model can only be reasonably applied to the data provided it is certain that the output of the study establishments is homogeneously measured.

Table 44 presents the coefficients of the logarithmic cost function that we have estimated. The following findings are highlighted by the numbers. Firstly, we find that the underlying cost surface is like a whip-saw in the log-log space, in this industry. The coefficient of the log-linear segment is positive and highly significant. This means that as scale of output rises early on, unit cost declines significantly, as, for instance, machines are 'run in', workers run up the learning curve. As a result of both factors, raw material wastage tends to decline. The log-square term is negative and highly significant too. Over the relevant range of output, this happens because severe diseconomies of scale and scope set in, thus ratcheting unit costs up. The log-cubic term then is negative once again, with its coefficient highly significant. Dummies for micro, small and medium establishments are each highly significant. Because the large establishments provide the control in the specification of these three dummies, the implication is that relative to large establishments, unit costs of micro, small and medium establishments are, given their quality quotients, significantly lower.

Table 47: Determinants of logarithmic cost function in the Light Engineering Industries

(Regressing natural log of average production cost per unit of output in Taka)

Model	Regression coefficient	t-stat
(Constant)	9.552	28.213
Dhaka	-0.260	-1.269
Chittagong	2.669E-02	0.113
Q	1.883E-02	10.235
Q2	-3.18E-05	-7.366
Q3	1.341E-08	6.114
Micro	-2.918	-8.173
Small	-1.553	-4.805
Medium	-1.247	-3.349
R^2		0.779

Dependent variable Ln_C

Note: Single asterisk attached to a T-statistic implies that the corresponding regression coefficient is significant at 5% error probability level, and two asterisks imply significance at 10% error probability level.

Source: SMEF Survey, 2008

Knowing that the rate of output drives unit cost, while it is certainly of some pedagogical interest, is not of much policy importance. This is so because the output is itself a composite, and the subject of the combined influence of many a factor of production. It does not single out the role or the importance of any one particular driver that may be of some quantifiable importance to policy makers.

Much has been made in the literature of the fact that capacity utilization be used as a competitive cost driver. This does not however accord very well with econometric principles. Capacity utilization is simply a ratio between the rate of output achieved to some well-formed notion of economic capacity. One reason why this is not all that interesting from the perspective of policy formulation is because in a real sense, this is not all that dissimilar to the foregoing cost function: unit costs are merely functionally dependent upon not so much the measure of output as on a transformation of output. The latter is bound to closely correspond to the output itself. Therefore, this formulation is not interesting for the same reason that the first functional formulation is not interesting.

Actionable plans for lowering average costs

From a number of studies, we now know that unit costs are powerfully influenced by the rate of output, by capacity utilization, by locational advantage, the relative reliance on imports, and the like. Of this, all three are potentially relevant from the perspective of policy feasibility. For instance, the rate of output can be influenced by fostering greater competitiveness in the markets for or greater access to the capital input, or both. Note that interest rates in Bangladesh which are among the highest in Asia (Chowdhury and Miah, 2006; Chowdhury, 2007) can potentially be lowered using measures that bring about greater competitiveness in the credit markets.[99]

It is entirely satisfying that capacity utilization (CU) is inversely related with unit costs. This implies that measures that positively motivate CU will lower unit costs and thus improve competitive performance of establishments.

Units that are located on the main grid of the roads or within some well-recognized clusters tend to have lower average costs compared with units that are located more inland.

And finally, reliance on imports ramps up costs. This is largely because imports are squeezed for all they can sustain. Bangladesh depends on customs duties on imports for more than 40% of her revenues. Imported inputs are therefore more pricey and expensive compared with inputs that are domestically produced.

We include interventions in the Action Plan that we write for the Light Engineering Industries so as to assist the establishments in this industry to lower their costs, and thus improve t heir competitive positions in the industry.

Will drawing up of a tactical plan whereby to mitigate each of the competitive gaps in the performance of sample of enterprises form each of these industrials. While the details of this information will be presented in the Action Plan that we include later in this report, suffice it to say for the moment that the following are the principal props of this action plan:

[99] Already, the SME Foundation is on the cusp of initiating credit wholesaling in an potentially effective effort to lower the binding interest rates that especially micro and small establishments have to pay while servicing their loans from the banking system.

1. There has to be a certain degree of facilitation by appropriate authorities in the interest of increasing the capacity utilization of the establishments in the industry. Such authorities may include the National Board of Revenue (NBR), the Ministry of Industries, the SME Foundation, the BSTI. Clearly, the taxation policy of the country will have to carry a lot of the burden of rolling back the average costs for industry. Naturally enough, the NBR, as the locus of the design and the implementation of the Government's taxation policies too will also have to become more accountable in terms of rolling back the costs.
2. Unit cost is merely the observe of the level of factor productivity achieved or, more precisely, of the total factor factor productivity. Anytime factor productivity increases in an industry, the average cost of production in it falls. This recognition makes it imperative to take a close look at the whatever influences the level of factor productivity. Our own analysis suggests that capacity utilization, the rate of output, the age of the capital machinery, the nature and the length of the training by the entrepreneur, the location of the enterprise, are the factors that influence average costs.

The ICT Platform of the Light Engineering Industries

The world is inexorably being transformed by the Information Revolution. Information technology (IT) has profoundly transformed the *modus operandi* for customer satisfaction in businesses. The delivery of government services and its interactions with the governed have changed like never before. Markets, production, storage, marketing, safe-keeping one's money, keeping track of it, even making it, have morphed due to ICTs in ways never before thought possible. In a famous prediction, a pair of American professors, both having trained in software engineering, wrote that by 2010, about a half of the entire US GDP would comprise of output of industries that either mostly produced information-rich output or consumed it (Shapiro and Varian, 1998). The last 15 years have been famously iconoclastic: one epochal markers after another has been rendered obsolete, in a blur of a phenomenal increase in speed at which and the intelligence with which machines, devices and systems---cogs in the machine that the "information economy" has become---compute, store, retrieve and send across information and data (Chowdhury, 2002). Indeed, everyone's conceivable paradigms in computing, communications and connectivity have been shifted so often in the past few years that many have understandably foresworn counting (Chowdhury, 2003).

The positive net contribution total factor productivity, in developed countries is widely accepted. Investment on IT is found to have spurred the total factor productivity growth (TFP) in the US economy.[100] The estimates range from 0.31% annually by Gordon (2000) to a relatively high 1.19% in a study by the Council of Economic Advisors to the US President's Executive Office (CEA 2001). TFP growth due to IT is far greater within the IT-using industries than in the IT-producing industries. That finding is intuitive, in that IT-using industries (such as financial or healthcare industries) are more information-dense in their business processes, which therefore respond more vigorously to IT investment.that investment in information technology (IT) typically makes to the rate of productivity growth, usually measured in terms of

[100] Economic growth of nations may stem from factor accumulation (of labor or capital) or from growth in total factor productivity (TFP).

The ascendant paradigm in communications technologies had its origin roughly in the mid-1990s. A World Bank classic, "Telecommunications is dead, long live computer networking" (Bond, 1997) best presents this paradigmatic shift. Telecommunications, powered by "circuit-switching" technologies, were symbiotic with the old and onerous, the obese and the over-centralized. Computer networking, of which the best-known icon is the World Wide Web (WWW), is by contrast programmable and prodigiously powerful, plebian in pricing, lean and forever learning. The differences in economics between the two are simply staggering, with the Web on the cusp of virtually killing off telecommunication as we have known it. Of particular significance is the centrality of open standards, greater accessibility and therefore the greater proneness to innovation, the shorter time-to-market, etc. that characterize the 'Net-heads' world compared with the 'Bell-heads'.[101] The WWW has profoundly transformed success drivers in business in rich countries. Businesses, governments, charities, and citizens have flocked to the Web to deal and heal, to learn and leverage, to inform and be informed, to educate and to entertain, to make, safe-keep and spend one's money and so on. Women outnumber men on the Web. And, like with "brick-and-mortar" buying, clothing is the largest draw of online spending. The "online" buying is becoming pretty much like "offline" buying. In short, the WWW is fast becoming the central character in a cast of thousands. A fluent understanding of the Web and technologies and competencies to leverage it has become an essential ingredient of success drivers---of competitiveness--- in the 21st century.

The state and the relevance of the information and communications technology infrastructure that is harnessed by the sample observations is therefore of some interest to us. The following tables present information about these aspects concerning the establishments on our sample. Several findings are worthy of being mentioned. Firstly, the percentage of cases of establishments owning and using personal computers overall is found to be 70%, and of server-grade machines 10%. Similarly, some 45% of the establishments have an internet connection. Significantly, this proportion of internet access is somewhat higher compared with the proportion of cases of establishments that have at least one mobile telephone: forty one percent of the establishments have at least one mobile phone. The proportion of cases where the establishment was found to have at least one fixed telephone line was about 65%, significantly in excess of the corresponding percentage of cases where establishments owned either Internet access or a mobile telephone. This shows that fixed telephone line in this industry still retains an edge when it comes to selecting the mode of people of keeping connected for business or recreation. The reason why this is so is probably because the broadening of the base of the use of the internet is impeded by the lack of Internet bandwidth, for all the rapid rate at which Internet bandwidth provisioning in Bangladesh has grown. Another reason why the penetration of mobile telephony on this sample still lags behind fixed telephony is probably the fact that, for all the bounding growth rate of mobile telephony subscriber base, many areas are not characterized by robust and always-available network connectivity.

Table 46 reports on the average number of personal computers, servers, mobile and fixed telephony connections etc. that the sample has returned per user.[102] Several findings are worth emphasizing here. First, establishments that admitted to owning any personal

[101] "Bell-heads" are named after the Bell Telephone Company, one of the veritable icons of the tele-communications world.

[102] These are averages. These averages are calculated based only on respondents that own any or all of the ICT devices cited in the previous discussion. Cases returning zeroes, while perfectly valid for other computations, have been omitted from the calculations surrounding Table 46.

computers admitted owning an average of 2.42 personal computers. Establishments that admitted to owning any personal computers admitted owning an average of 1 server-grade computers. Establishments that admitted to owning an access to the Internet admitted paying for an average of 42 Kbps of access to Internet bandwidth. Establishments that admitted to owning any mobile admitted owning an average of 3.84 mobile telephones. Establishments that admitted to owning any fixed telephone admitted owning an average of 1.84 fixed-line telephones. Establishments that admitted to owning any business automation software admitted owning an average of 1.75 software of that nature.

Table 48: Profiles of the penetration of information and communications technology into Light Engineering Industries, Bangladesh ICT

% of establishments using

Firm size class	PCs	Servers	Internet access	Business automation software	Mobile telephone	Fixed telephone
Micro	2.63	0	2.63	0	92.11	39.47
Small	12.64	4.59	4.60	0	80.46	77.01
Medium	41.18	23.52	23.52	5.88	82.35	88.24
Large	37.5	37.5	37.5	0	87.5	100
MiSmall	9.6	3.2	4	0	84	65.6
MeLarge	40	28	28	4	84	92
All firms	14.67	7.33	8	0.67	84	70

Source: SMEF Survey, 2008

Table 49: Profiles of the penetration of information and communications technology into Light Engineering Industries, Bangladesh

Average no. of various ICT products used per establishments

Firm size class	PCs	Servers	Bandwidth	Business automation software	Mobile telephone	Fixed telephone
Micro	3	0	26	0	1.43	1.07
Small	1.58	1.25	30.66	0	1.76	1.10
Medium	1.28	1.5	36.75	1	4.14	1.47
Large	6	4.67	38	0	6	2.63
MiSmall	1.58	1.25	29.5	0	1.65	1.10

Source: SMEF Survey, 2008

Table 47 is about management hierarchy. Taxonomically, 'flat' versus 'hierarchical' management structures are really the two polar divides that come to mind. The two terms are not necessarily unambiguously defined in the literature. Lay people would understand by flat management structure a rather loose, informal, fluid structure in which canons regarding relationships between tasks and briefs, chain of command and accountability, even rewards and rebukes, are not formalized. Such informality is frequently the mantle of micro and small, at times even medium-sized, enterprises. Hierarchical management structures however set much larger store by codification and formalization, documentation and processes. Such processes are often written into business rules that get codified into the working of human resources software that get written so as to enforce such hierarchy in as much an impersonal manner as possible.

Respondents were asked to assess if their own management structures were flat in some 'general' manner. Their responses have been tabulated in Table 47 below. Several findings stand out. First, a full 70.7% of the sample respondents consider their own management model as being 'flat' in nature, while another 29 % think theirs are a hierarchical management model. That said, secondly, important difference emerge between MiSmall and MeLarge establishments. Whereas as much as 83% of the sample establishments consider themselves to have 'flat' management structures, the corresponding percentage for the MeLarge establishments is only 56%.

Table 50: Profiles of the management structure in Light Engineering Industries, Bangladesh

	Units having a flat Mgmt structure		Units having a hierarchical Mgmt structure		All	
	No.	% of total	No.	% of total	No.	% of total
Micro	38	100	0	0	38	100
Small	87	100	0	0	87	100
Medium	17	100	0	0	17	100
Large	6	75	2	25	8	100
MiSmall	125	100	0	0	125	100
MeLarge	23	92	2	8	25	100
All	148	98.67	2	1.33	150	100

Source: SMEF Survey, 2008

The next topic is about growth strategy. But before we take growth strategy up, we have to remind ourselves that growth will need to be pro-poor. In a pro-poor scheme of things, we need to grasp, with some real accuracy, the process whereby the 'demand' for labour and capital drive themselves at the levels of the firms that comprise the world of manufacturing. After all, it is these drivers of factor demand in general, and of labour in particular that any growth strategy will need ultimately to be about. We therefore have invoked a full-information model so as to estimate a system of 'input demand functions'. The factors or inputs considered are labour, fixed capital and material inputs. The following is the structure of the model. In order to estimate this system of equations, we employ Zellner's Seemingly Unrelated Regression Estimators (SURE). This estimator is the most appropriate when the disturbance term are correlated across the equations comprising a system of equation of the kind to be introduced in the appendix to this report. It is quite appropriate to say that it is in the determination of the labour demand and capital demand that we are most interested.

Labour demand:

We find that the labour demand function is negatively sloped in wage rate (lnW), which is what it should be. The regression coefficient is statistically highly significant.[103] We find that the labour demand function is positively sloped in product price (lnP), which is what it should be. The regression coefficient is statistically highly significant. We also find that the labour demand function is positively sloped in fixed capital (lnK), which is what it should be. The regression coefficient is statistically highly significant. We find that the labour demand function is negatively sloped in the dummy variable relating to automation (D_a), which is what it should be. The regression coefficient is statistically highly significant. The upshot is that this estimate of the labour demand equation is quite intuitive. It says that in

[103] Note that with SURE, it is z-statistics, rather than t-statistics, that is calculated in order to assess statistical significance of individual regression coefficients.

order to stimulate the demand of labour by the establishments in the industry, efforts have to be made in order to lower the reservation price of labour. Reservation price is about the minimum opportunity cost that is consistent with the worker being able to reproduce its labour-selling power and thus deciding to supply labour. Essentially, reservation price revolves around workers' cost-of-living. Clearly, there is a lot that public policy can do about workers' cost of living. Foremost among them is about leveraging the cost of food as a policy variable.

Secondly, we find that the amount of labour that entrepreneurs demand is a positive function of the average product price they can charge. The higher the average product price, the more labour they tend to generate. Now product price is about the quality and the design of the product, its workmanship, the use of more expensive, more attractive and yet more user-friendly packaging material for the product. Ultimately, this is about the amount of industrial knowledge that goes into the product. Our results show that the higher is quotient of the application of knowledge embodied in the product, the larger is its knock-on effects on the demand for labour that it creates.

Thirdly, the amount of fixed capital that an enterprise has to work with also positively drives its need for worker. This implies that there is also a need, in the interest of spurring pro-poor growth, to increase the capital provisioning especially of MiSmall establishments. Such enhanced capital provisioning would energize their demand for labour, and would be good news for pro-poor growth.

Fourthly, the automation dummy has a negative and statistically highly significant coefficient. The higher is the index for automation, the lower is the demand for labour. There are times when entrepreneurs automate their business processes not necessarily because such automation is ultimately good for cash-gains but because everybody else is doing it too. That is, sometimes, automation can be copy-cat automation. And now we see that automation hurts the cause of human workers. There is therefore a need for programmes that increase the awareness of employers about the pernicious effects of automation in the workplace from the perspectives of pro-poor growth and therefore of 'corporate social responsibility'. This connection is easily worth the creation of a project which centers around the dissemination of greater managerial awareness about the antithetical effects of automation 'policies' that might be pursued by the management, and the livelihood compulsions of average blue-collar workers.

Table 51: Towards the drivers of a growth strategy for Light Engineering Industries of Bangladesh

Table:SURE

Head count	B	Z	Mean	Elasticity	B	Z	Mean	Elasticity
Wage rate	-0.03414	-0.15			-0.0049826	-0.68		
APP	-.00109	-1.11			-0.000028	-0.90		
Fix cap	0.00065	0.84			0.0000232	0.95		
Automation Dummy	2.338	0.21			0.176652	0.48		
Output	0.0773	1.80			0.0031079	2.14		
Dhaka dummy	-17.623	-1.64			-0.75307	-2.07		
Cht. Dummy	-15.047	-1.29			-0.3464	-0.86		
Constant	36.44	2.52			3.327	7.03		
Fix cap								
Interest rate	501.47	1.13			-0.0845	-0.87		
APP	0.0271	0.12			-1.75E-06	-0.04		
Output	4.3536	0.42			-0.0030799	-1.33		
Automation Dummy	-3598.84	-1.4			0.1295	0.23		
Dhaka dummy	-5732.001	-2.26			-0.594	-1.05		
Cht. Dummy	-2930.336	-1.03			-0.1389	-0.22		
Constant	-1044.693	-0.12			9.5672	5.16		
Input								
Input price	-685.28	-4.81			-0.0223	-5.83		
Output	46	0.52			0.0107	4		
Automation Dummy	-50718.23	-2.18			-0.4877	-0.70		
Dhaka dummy	39869.23	1.75			-0.1516	-0.22		
Cht. Dummy	-942.90	-0.03			-0.550	-0.66		
Constant	180408.5	4.92			8.214	8.01		

Source: SMEF Survey, 2008

Table 52: Growth in selective variables per year over the life of firms in

Firm sizes	Employee growth rate	Equity growth rate	Revenue growth rate	Machine growth rate
Micro	7.57	22.42	25.74	7.53
Small	12.17	29.14	37.32	12.79
Medium	11.61	15.62	22.37	7.53
Large	15.19	66.62	92.64	9.75
MiSmall	10.77	27.09	33.80	11.19
MeLarge	12.75	31.94	44.86	8.24
All	11.10	27.90	35.64	10.70

Source: SMEF Survey, 2008

Table 53: Regression of growth

	Ln Equity growth		Ln Revenue growth	
	Regression co-efficient	t-stat	Regression co-efficient	t-stat
Constant	0.899	11.552	1.075	10.106
Ln Age of unit	-0.209	-11.286	-0.220	-9.367
Cluster	-5.32E-02	-1.965	-2.51E-02	-0.709
Automation dumy	7.110E-02	2.506	9.988E-02	2.665
Ln Fixed capital/Labour	-2.33E-02	-2.424	-4.33E-02	-3.573
Micro	-0.176	-2.824	-7.55E-02	-1.871
Small	-8.26E-02	-1.450		
Medium	-0.101	-1.585	3.98E-02	-0.731
Ln APP			4.023E-02	-1.473
Dhaka	8.786E-02	2.374	4.023E-02	1.078
Chittagong	4.803E-02	1.121		
R-square	0.547		0.468	

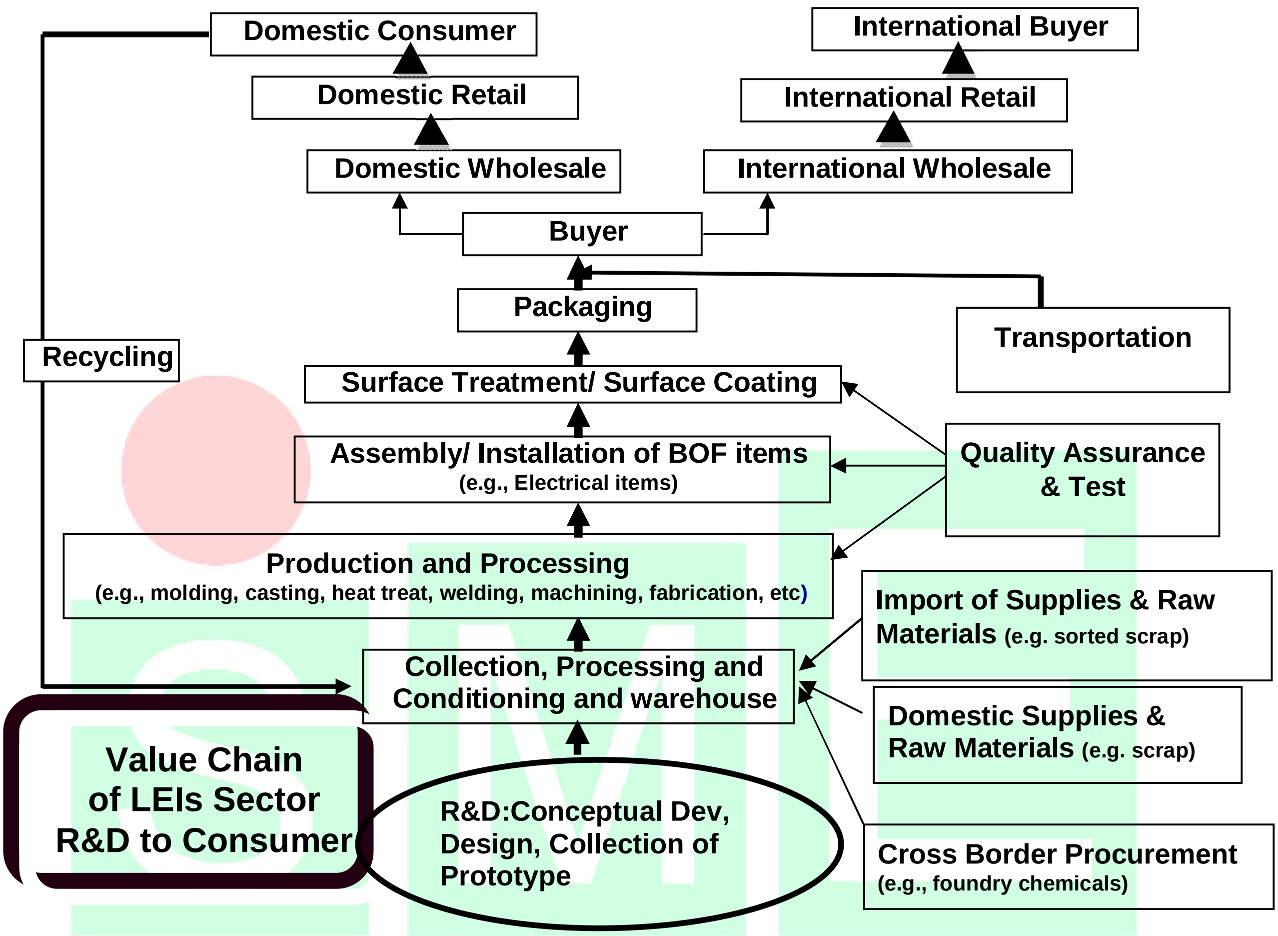
Source: SMEF Survey, 2008

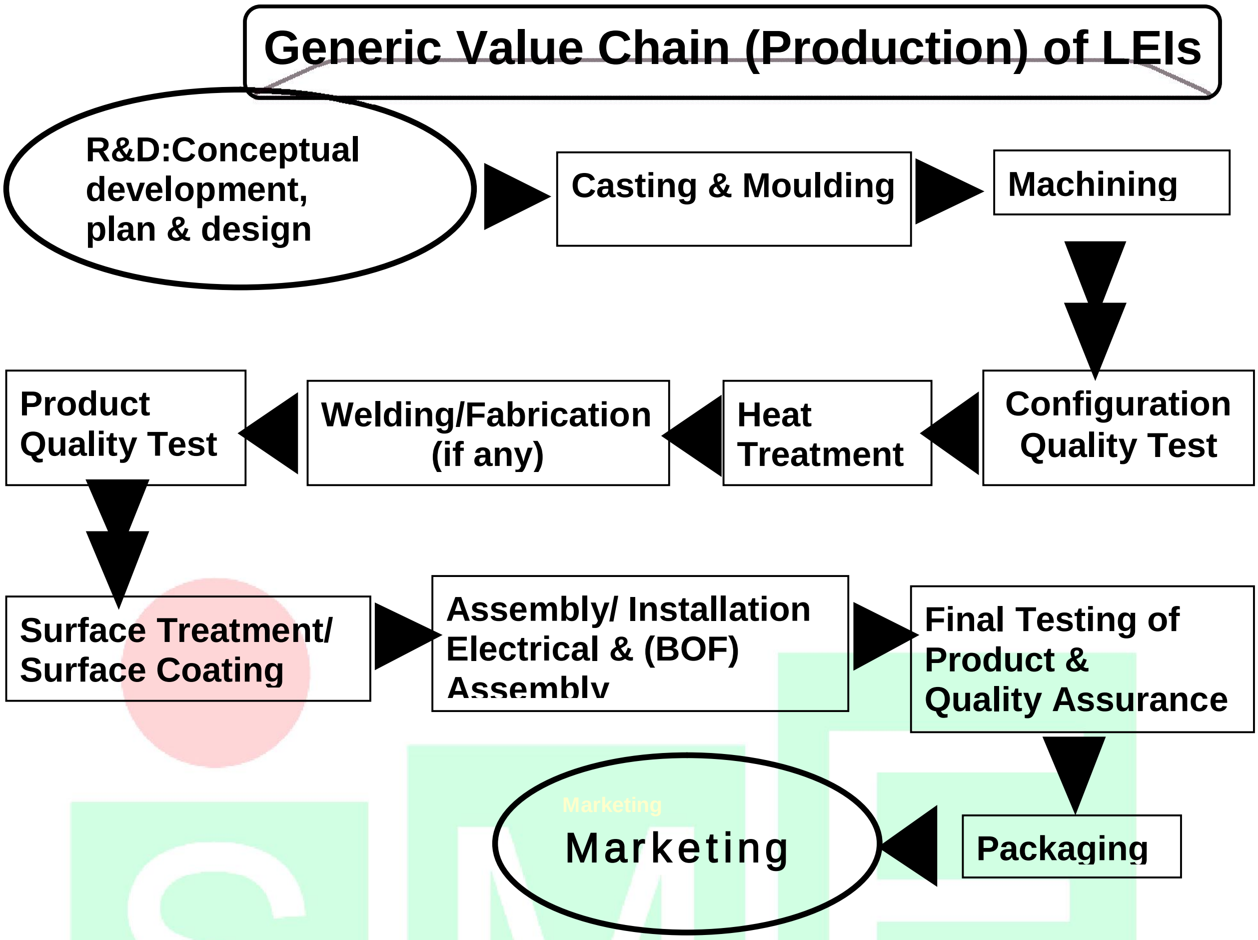
The demand for capital:

We find that the capital demand function is positively sloped in interest rates (lnI). Given that, as conventional wisdom would have it, credit rationing may well pervade the credit markets in Bangladesh, this result, which is *prima facie*, counter-intuitive, is ultimately sensible. This is saying in effect that the credit market is supply constrained, and that in order to obtain more credit, or to obtain a larger-sized credit contract, you will need to up the ante---by promising to raise the interest rate that you agree to service. This is a typical result of the presence of rationing in the market. We find that the capital demand function is positively sloped in product price (lnP), which is what it should be. The regression coefficient is statistically highly significant. We find that the capital demand function is positively sloped in the dummy variable relating to automation (D_a), which is what it should be. The regression coefficient is statistically highly significant. After all, firms need access to larger amounts of capital in order to move up the automation scale. The upshot is that this estimate of the capital demand equation is quite intuitive. It says that in order to stimulate the demand of capital' by the establishments in the industry, efforts have to be made in order to lower the prevailing interest rate so that access to capital becomes more and more affordable. Clearly, there is a lot that public policy can do about interest rates. Foremost among them is about empowering public-private partnerships (PPP) such as the Small and Medium Enterprise Foundation (SMEF) credit wholesaling programmes, and things like that.

Chapter 8

Value Chain of Light Engineering Sector




Generic Value Chain (Production) of LEIs
R&D:Conceptual development, plan & design
Casting & Moulding
Machining
Configuration Quality Test
Heat Treatment
Welding/Fabrication (if any)
Product Quality Test
Surface Treatment/ Surface Coating
Assembly/ Installation Electrical & (BOF) Assembly
Final Testing of Product & Quality Assurance
Packaging
Marketing

Chapter 9

Action Plan and Growth strategy of Light Engineering Sector

9.1 Introduction:

Growth strategy is primarily a matter in which development economists are interested. Because growth itself owes to two broad classes of source, a growth strategy will be about activities that channelization of two kinds of resources into the industries of interest. The following is a definition of a growth strategy that we employ in this study:

"A growth strategy is a coherent organization of initiatives, especially by the government and public-private partnership (PPP) sector, that have demonstrably positive effect on both factor accumulation and factor productivity growth in the sector of interest".

There are two keywords in this definition that it is worth drawing particular attention to. First, the initiatives must have a demonstrably positive effect on both factor accumulation and factor productivity growth, based on statistically significant regression coefficients. We shall carry out multivariate regression equations to explain statistical variations in two classes of variables, namely, factor accumulation and factor productivity. Only factors that have statistically significant coefficient in these regressions warrant inclusion in a growth strategy. Quality money and time will potentially be invested in implementing the sector growth strategies that this work will help spawn. It is therefore imperative that the initiatives and interventions that we highlight must pass muster based on rigorous statistical tests involving causalities that are theoretical sound and intuitive.

Factors that strongly motivate factor accumulation in the Light Engineering Industries

Results from the regressions of equations seeking to relate to factor accumulation in the Light Engineering Sector of Bangladesh are presented in the following tables. Before proceeding any further, the following methodological points need to be repeated. By factor accumulation, we refer to the process whereby the number of workers and the amount of capital that accumulate in an enterprise. This we estimate by using Seemingly Unrelated Regression Estimators (SURE) of labour and capital demand functions.

From the findings of the tables, we can reach the following conclusions about the drivers of factor accumulation. First, location within the city of Dhaka is a major determinant of the accumulation of capital in this industry. Second, the location within a cluster, whatever the city of domicile, is a second major positive driver of capital accumulation.

From a policy perspective however it is how the factors determining productivities of the sample establishments is potentially more ground-breaking. Here the following factors rate a pointed mention each.

First, we find that average working capital provisioning is a major driver of factor productivity. This result needs to be elaborated just a little bit, in the following manner. First, the light engineeringindustry is not a highly mechanized activity.[104] And yet capital,

[104] In the literature, mechanization is often used synonymously with 'machine-pacedness'. A production process is machine-paced when capital equipment is comparatively more prominent relative to labour. Typically, this

which is the comparatively more scarce factor of production in Bangladesh, has two components, one fixed and the other working capital.[105] Because fixed capital is of relatively little use in this industry, it is only natural that capital's other component---working capital---will have to do the heavy lifting in garnering productivity. That is exactly what is happening in the light engineeringindustry.[106]

Second, establishments located in Dhaka and Chittagong, the largest markets for goods, services, skills, credit and technical assistance, are significantly more productive than are establishments located outside these megapolis.

Establishments that were set up longer time ago have a corner on productivity. This is quite intuitive. Successful management is all about mastering all the nuances of knowing the customer, knowing the most productive production organization, knowing the vicissitudes of a fickle customer base, and knowing the nuances of managing trade credit as a resource. Captains of fashion industry are fond of saying: "There is no end to good design": this suggests that successful entrepreneurship in this industry requires diligence over many many of years of relentless and flawless execution of one's plans. Naturally enough, in doing all of that, time is itself a great mentor.

None of the other explanatory variables posited alongside the main variables was found to be significant.

This allows us a mandate to say that the growth strategy for the light engineeringsector will need to confine to focusing (1) working capital provisioning; (2) giving priority to the establishments in the light engineeringindustry in the two metropoles by measures that foster greater inclusion in the channeling of working capital finance, especially for the MiSmall establishments in the in Bangladesh. And finally, anything that is good for the longevity of these establishments is also good for their productivity.

Sector's Policy Framework

Of course, Bangladesh has an industrial policy, despite having an Industrial Policy 2005. Bangladesh has not had any systematic industrial policy to speak of. This applies to the light engineeringindustry as well. And this is not to be regretted: having a fully-fledged industrial policy is likely to have cost Bangladesh prohibitively. But Bangladesh certainly needs to more to steer and target legitimate public and PPP assistance to 'deserving'

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attribute is measured in terms of the capital-labour ratio. Measuring capital costs is unusually messy in empirical economics. This is due to the varying proportions of respondents of using used line-up of equipment which themselves were bought in a far-off past, with a great deal of technological progress in the industry producing such equipmentmakes it unusually difficult to get at true capital costs in today's prices. In other words, technological obsolescence introduces a lot of 'noise' in the data. Secondly, written-down values, which are capital values net of accumulated depreciation, have almost no real correspondence with the residual 'economic life'. It is imperative to therefore get at 'replacement cost' of capital equipment in order to deal satisfactorily with these two problems. We therefore define 'machine-pacedness' in terms of replacement cost of capital divided by the number of workers employed by the sample firms.

[105] We invoke the concept of scarcity at this juncture because, in theory and in principle, it is the scarcer factor that can be expected to out-produce the comparativelymore abundant factor of production, namely labour under conditions prevailing in Bangladesh.

[106] And this centricity to working capital when it comes to motivating productivity is not unique to designer goods alone. It also happens to be a recurring feature of our sample of establishments.

establishments in ‘booster’ or ‘priority’ industries. We shall return in the following to the issue of what ought to define ‘priority’ industries, and ‘deserving’ establishments.

Action Plan

Task 1: Capacity Building through skill development

To upgrade skills of technical workforce of machinery, automobile spares and foundry, and to build marketing and management skills for factories and foundries, entrepreneurs in order to respond to the markets demand

The objective encompasses capacity building of the enterprises and the sector, including development of human resources, entrepreneurship, corporate management capability through training and other measures. This would lead to the development of a skilled and qualified workforce for the LEIs factories and iron & steel foundry. Training should be designed targeting 2 categories of people: i) management & ii) workers/technicians. Governments of countries embarking upon industrialization should plan early for the growth of an efficient light engineering sector especially foundry industries. The light engineering sector is essential to the industrial development of a country because they providing replacement parts for almost every machinery that are used in agriculture, transportation, construction, water supply and sanitation facilities and so on. Hence, this will avoid long delay in obtaining them from the original manufacturer or from more industrialized neighbouring countries. The small, primitive and poorly equipped light engineering industries making substandard products must be modernized to enable them to produce products of commercial quality that are acceptable in international markets. So, quality standards must be high and production facilities such as testing and control laboratory is a must in order to be competitive in the international market. Manager, engineers and technicians must be trained to use modern processes, equipment and the best practices in every step of production processes. Training on continuous improvement in engineering, technical knowledge and test and inspection shall be held regularly so as to provide them with the latest technology and innovation. Good management practices should be made under favourable atmosphere for the people to effectively and safely work. Arrange awareness programme on global markets and competitive Bangladeshi advantages who are working in agricultural related activities could be partners in exploring and carrying out interventions in this sector. Follow the best practices in other countries (i.e. India, Malaysia) in developing and improving skills of human resources in similar circumstance. High profile organizations need to be brought in to work culture needs strong coordination among them On the job training or apprenticeship short training for the fresh graduates. Selection of trainers and trainees is important in order to carry out fruitful training programs. Developing relevant and appropriate curriculum for training is very important Vocational training institutions should refresh and review their training targeting to improve capacity of the workers/technicians group. Regular short dialogue is required to find out the areas to improve the capacity. Coordination among laboratories and workshops Training manual written in a simplified way in Bangla should be given to the trainees so that they can use these effectively and decentralizing the training programs should be carried out all over Bangladesh. Training needs to be participatory by contributing a portion of the fees but at the same time it needs to be sustainable to some extent. Training need assessment is required among entrepreneurs and their workers.

Implementation Road Map

1. Training for improving technical skills of foundry and manufacturing

Industrial /Agro machinery and Automobile Spare parts

Develop specialized technical training on metallurgical technology. Technical training should be provided to the machine shop personnel to improve the quality of their work. Formal training/courses on machining are available under technical and vocational education program (Implementation partners: BSCIC, BITAC, NPO, MAWTS etc.)...

Develop specific programmes of training on LEIs machine technology (such as CNC, EDM, etc) Focus on 1st generation of machines and especially the finish of the products: Welding and how to make “nice” welding, drilling machines, bending machines, cutting machines, lathe machines, lock/punching machines. Know how to clean and prepare the equipment before painting. Carry out a first painting and second painting of the equipment to be exported. Introduce quality control and how to measure the quality. Export packing is also very important and how to fix box sizes in order to maximize the content in a container either a 20 ft or a 40 ft container. Trainings on machining allowances and tolerances and operation of CNC machinery such as lathe, milling and boring (Implementation partners: BUET, BSCIC, BITAC, MAWTS etc.)

Organise training on Mechanical design, CAD, CAM. The business support institutions (i.e. BITAC, BUET, etc.) could offer these training commercially. These institutions should have wide circulation among the entrepreneurs and re-design their course according to market demand.

Foundry

Organise training on welding. Formal welding training/courses for technicians are available under technical and vocational education program. (Implementation Partners: BSCIC, BITAC, NPO, MAWTS etc.)

Develop training on pattern making, mechanical design, CAD, CAM (Implementation partners: BSCIC, BITAC, NPO, MAWTS etc.).

Develop trainings on practical technology of casting covering the product development and casting design, pattern making, standard practices in moulding process, standard practices in melting cast iron using cupola and induction furnaces and test inspection and counter measures of casting defects. SEDF has brought an expert from India to introduce upgraded technology and to set up induction furnaces in 2 foundries in Bogra on test basis. (Implementation partners: BSCIC, BITAC, BUET, NPO, MAWTS etc.)

Train the managers, engineers, skilled technicians on quality and technical knowledge of foundry technology on the regular basis covering both the practical as well as technical theory and methods (Implementation partners: BSCIC, BITAC, BUET, NPO, MAWTS etc.)...

Develop trainings and organise workshops for entrepreneurship development; strengthen entrepreneurs’ motivation and business entrepreneurial culture (Implementation partners: BUET, BIM, BSCIC, DU etc.).

2. Training for improving management and Commercial skills of foundry and manufacturing

Develop trainings on sales management, marketing and how to prepare and organise participation in international trade fairs, on distribution channels, on gathering and analyzing information related to products, market segments or competitors, and on how to target specific countries (Implementation partners: FBCCI, DCCI, BUET, BIM, DU, BSCIC, etc.)...

Develop trainings on accounting management. Find out which currency to use. How long the offer can be valid or make the contract terms subject to any currency fluctuation in order not to "loose" on the currency and any other issue related to payment and minimizing the commercial risk (Implementation partners: BIM, DU, BSCIC, BITAC, BUET, etc.)

Develop trainings on logistics. Find out the best and most efficient way to transport the goods to the buyer, how to get the products to the harbour, where to make the packing into container – at the warehouse – or at a forwarding agents place. How to stow the container in order to avoid damage during transportation. What type of shipments to use and what packing is needed to prevent any transportation damage, what type of insurance? (Implementation partners: BIM, BUET, DU, BSCIC, etc.)

Develop trainings on e-commerce (using the e for enterprises directly or through ecentres hosted in TSIs or TPOs. Investigate whether the products are normally traded through these channels. Find out if the target buyers are end-users or importers or agents before selecting this way of trading (Implementation partners: BIM, DU, IEB, BSCIC, BITAC, BUET, MAWTS etc.)

Trainings on export processing, finance, marketing and regulations Ask different bankers with experience in handling export document. What regulations do exist in the country and what regulations do the importing countries have (Implementation partners: FBCCI, DCCI, BUET, DU, BSCIC, etc.)

Develop trainings for entrepreneurs on export processing and export financing mechanisms such as L/C matters Organize with export qualified and oriented bankers seminars training how to prepare required export documents in order to meet L/C and other requirements. This could be export invoice, packing list, certificate of origin, Bill of Lading, quality certificates etc (Implementation partners: EPB, BPC, BUET, DU, BIM, FBCCI and DCCI, etc.).

Train Light Engineering stakeholders on communicative English. Organize special training in English for export managers and stakeholders in communications with potential customers. This is for writing and speaking. (Implementation partners: local training institutes, etc.)

Train producers/exporters on how to approach banks, on how to manage credits and on how to develop a constructive relationship with banks and on import process (Implementation partners: EPB, BPC, DU, BIM, FBCCI and DCCI, etc.)

Develop specific training programmes for foundries and factories on quality control and best practices. Prepare and have drawings of each and every part with reference numbers, which have to be manufactured before assembling the machine/equipment. Check the raw materials, measure all parts before start assembling/welding the machine/equipment. Measure the machine/equipment after assembling according to drawings. Check the cleaning of the machine/equipment before painting. Check the painting (thickness etc) Check the export packing (Implementation partners: BSCIC, BUET, BITAC, NPO, MAWTS etc.)...

3. Other Trainings and best practices

Visit to other foundries especially outside Bangladesh to experience the best working practices in foundries producing cast iron with cupola or induction furnace (Implementation partners: Min. of Industry, Min. of Commerce, BPC, SEDF, LEIC NPO, etc.) SEDF has already taken initiatives in this regard and has had sent a group of foundry owners to India for an extensive study tour in collaboration with pertinent associations from both the countries. Another group from BEIOA has been sent to China to visit the light engineering workshops and trading sector.

Organise regular group training courses in the scope of quality control and safety awareness (Implementation partners: BSCIC, BUET, IEB, BITAC, DCCI, etc.)...

Train and arrange counseling desk in EPB, BPC, FBCCI and DCCI. Build the capacity of these organizations to offer specific services needed the sector stakeholders (Implementation partners: EPB, BPC, FBCCI and DCCI, etc.).

Build capacities by training the banks to assess credit requests for the sector to understand the sector preoccupations (Implementation partners: BIM, EPB, BPC, DU, FBCCI and DCCI, etc.).

Make donor funds available (like the Danish DANIDA or EU) for training of students in technical schools, a forum for product development could also be created (Implementation partners: SEDF, DANIDA, CIDA, DFID, EPB, BPC, BUET, DU, BIM, FBCCI and DCCI, etc.).

Develop new entrepreneurship programmes especially from qualified graduates (Implementation partners: BUET, BIM, EPB, DU, BPC, FBCCI and DCCI, etc.).

Task 2: Access to Finance

To allow Light Engineering Industries to access finance for rehabilitation and adequate technology access

The objective entangles activities to facilitate access to finance through implementing various measures such as enacting bank and financial institution's pro-LEIs financing policy, implementing congenial microcredit, credit wholesaling, factoring, etc.

To carry out factories and foundries rehabilitation or access to adequate technology, entrepreneurs need to access finances from commercial banks or financial institutions. For years, they have bemoaned the lack of affordable access to finance, as banks requirements are too high together with the interest rates. It is imperative that the cost of investment capital is affordable and simplified to warrant improvements in all stages in the value chain.

Improvements in the production, technology, transport, communication, energy, infrastructure, all require some investment of some sort.

As a success story to follow and under the ITC project "Bangladesh Leather Service Centre for export development", Government and commercial banks of Bangladesh agreed to lend full support for developing a dedicated credit line - at favourable interest rate and to the extent possible collateral-free - for micro and small enterprises in the leather sector. Artisans are estimated at more than fifteen thousand distributed in several clusters of Muchi-Rishi communities1[1] producing traditional leather goods.

The Abdel Monem Foundation, upon advice of the Credit Development Forum – to whom the Grameen Bank created by the Nobel Prize Dr. Md. Yunus is also affiliated – has joined the initiative. The Foundation, under the guidance of Dr. Atiur Rahman, Chairman of the Forum, organized a panel discussion with the participation of major banks and the Central Bank of Bangladesh. The Foundation is sponsoring a survey of the clusters to determine needs and services required. Other banks, e.g. Sonali Bank and Janata Bank, have joined the initiative and are providing support in terms of staff for carrying out the survey and for setting up a database of micro enterprises. Other credit institutions have manifested the interest to join in. Facilitating access to credit is considered one of the pillars for sector development from artisanal to industrial level. The keen interest manifested by the banking system proves the conviction that the leather sector can play a crucial role in export development and that the Service Centre is seen as a catalyst to this process.

Implementation Road Map

Access Mechanisms to finance

Integrate in the LEIs Value Chain mechanisms allowing all the steps of the VC to access to finance from banks, government agencies and other financial service institutions…(Implementation partners: Min. of Finance, Min. of Industries, Min. of Commerce, Bangladesh Bank, Commercial Banks, Financial organizations, EPB, NBR, SMEF, BPC, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.).

Undertake a study comparing the LEIs financing mechanisms and bank interest rate existing in neighbouring countries and competitors countries and based on that develop appropriate reforms to build a better financial environment… (Implementation partners: Ministry of Finance, Ministry of Industries, Ministry of Commerce, Bangladesh Bank, Commercial Banks, Financial organizations, EPB, NBR, SMEF, BPC, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.).

Develop a dialogue with banks to improve mechanisms to provide finance to the sector at lower rates and learning from the previous failures. Single digit interest rate should be introduced and the interest calculation must be standardized. (Implementation partners: Min. of Finance, Min. of Industries, Min. of Commerce, Bangladesh Bank, Commercial Banks, Financial organizations, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.).

Hedging on bank exchange rates. Banks and credit agencies availing credit could facilitate by having a reduction of interest rates and softening collateral requirements to access credit. This could be achieved through corresponding macroeconomic and structural policies directed to lowering risks in the economy, inflation and strengthening banking and credit system Capital investment interest rate and running capital interest rate should be different. Banks should disburse a significant amount of 30-40% of the total credit amount to the LE industries as loans (Implementation partners: Min. of Finance, Min. of Industries, Min. of Commerce, Bangladesh Bank, Commercial Banks, Financial organizations, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.).

Equipment investment

Encourage and promote leasing programmes or grants to help SMEs modernize their equipment and increase volumes and quality products…(Implementation partners: Min. of Finance, Min. of Industries, Min. of Commerce, Bangladesh Bank, Commercial Banks, Financial organizations, EPB, NBR, SMEF, BUET, BITAC, BPC, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.).

Coordinate investment in new technology/machines…(Implementation partners: Min. of Finance, Min. of Industries, Min. of Commerce, Bangladesh Bank, Commercial Banks, Financial organizations, EPB, NBR, SMEF, BUET, BITAC, BPC, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.).

Coordinate investments in new machinery and equipment in order to utilize this investment as much as possible. …(Implementation partners: Min. of Finance, Min. of Industries, Min. of Commerce, Bangladesh Bank, Commercial Banks, Financial Organizations, EPB, NBR, SMEF, BUET, BITAC, BPC, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.).

Equity investment

Remove barriers to equity investment in LEIs. Identify the barriers that exist and which are slowing done the process to equity investment in LEIs…(Implementation partners: Min. of Finance, Min. of Industries, Min. of Commerce, Bangladesh Bank, Commercial Banks, Financial organizations, EPB, NBR, SMEF, BPC, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.).

Encourage and promote venture capital mechanisms allowing foreign investment to be attracted to the LEIs sector opportunities…(Implementation partners: Min. of Finance, Min. of Industries, Min. of Commerce, Bangladesh Bank, Commercial Banks, Financial organizations, EPB, NBR, SMEF, BPC, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.).

Communication

Build effective communication with banks by organizing seminars where bankers and stakeholders will exchange views and find solutions through an action plan to develop appropriate financial services for allowing the sector to access financing…(Implementation partners: Min. of Finance, Min. of Industries, Min. of Commerce, Bangladesh Bank, Commercial Banks, Financial organizations, EPB, NBR, SMEF, BPC, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.).

Create a fund to allow TSIs employees to have access to trainings in their speciality…(Implementation partners: Min. of Finance, Min. of Industries, Min. of Commerce, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.).

Create a fund or a mechanism to facilitate financing for stakeholders to prepare and participate with effectiveness to trade fairs…(Implementation partners: Min. of Finance, Min. of Industries, Min. of Commerce, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.).

Create a LEIs export group to examine how to simplify the export process development of document for bank such as a single window…(Implementation partners: Min. of Finance, Min. of Industries, Min. of Commerce, Bangladesh Bank, Commercial Banks, Financial organizations, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.).

Training entrepreneurs on how to have access to finance (export financing, capital investment, joint ventures) Organize training and seminars with different bank who is specialized and professionals in the different finance areas, investment in capital goods – rental arrangements and/or leasing arrangements available. Here it could be both bankers and other financial institutions. Find out what are their requirements and terms for entering such arrangements (Implementation partners: EPB, BPC, BUET, DU, BIM, FBCCI and DCCI, etc.).

Task 3: Technology Up-gradation

To move gradually from first to new generation machinery and improve quality monitoring and source of reference

Under the jurisdiction of this objective various activities to implement measures for technology up-gradation & development, technology transfer & dissemination, integration of modern machinery & production system, R&D, empowerment with ICT to be implemented including articulation of quality assurance system. Establishment of facility centers are essential to strive for development of diversified new & quality products for export.

Enterprises should be flexible enough to involve step-by-step quality monitoring systems and procedures at each stage in the production cycle to aid corrective measures where variances arise.

It is imperative that the sector streamlines testing operations to ensure quality compliance for products destined for local or international markets, to allow foundries to access spectrometer and also to facilitate import of raw material

Also, build capacities for manufacturers to meet export requirements in terms of quality and production volumes through training involving Quality control and Quality assurance (Qc/Qa) and Good Marketing Practices (GMP).

Implementation Road Map

First Generation

Upgrade to better moulding and melting processes with available technology in the market (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.).

Assistance should be provided so that machinery manufacturers and electronic firms can interact with each other in an effort to upgrade local products. BUET can provide assistance in this connection (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.).

Collect and disseminate regularly all available data and technical information on local foundries and assist in updating practices and improving the product (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.)

Technical support services should be provided to the local machinery manufacturer so as to enhance their capability of machine design. BUET can provide assistance in the machine and product design (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.).

Carry out a R&D on local sand, molding processes and new material besides cast iron (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.)

Design specific programmes for R&D institutes and Public organizations. How can the production process be simplified, how can the wear and tear parts be strengthen in order to avoid breakage – break downs – and save parts for same by the customers. Make tests of machines – short and long terms tests in order to evaluate and see the capacity and the strength of the machines/equipment before starting exporting (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.).

Interchange of technology and training (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.)

New Generation

Investigate which countries are going from 1st generation of different products to 2nd generation in order to be "first" in the market at the right time and with the right price. Develop a study on new generation technology on how to adapt it to Bangladesh. Implement activities in accordance with work plan (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.)

Replace gradually the first generation machinery with new machinery capable of providing the machining services in much better accuracy (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.).

Develop use of material such as carbon steel, alloy steel, etc of known specifications for quality and high performance products. However such materials are not readily available in the local market. Since the volume of demand of such material is low at present, local importers do not appear to be interested to import them. Local producers that have the ability to produce alloy steel do not produce them as standard product, mainly because of lower demand. Establishment of linkage among importers, producers and consumers of raw materials may help in making the required raw materials available. …(Implementation partners: Min. of Industries, Min. of Commerce, Min. of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Build Inherent Capacity

Develop a local expertise for servicing and application in the metal industries and centre for metallurgical as a source of references for local foundries (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.)

Recommend entrepreneurs to be flexible enough to involve step-by-step quality monitoring systems and procedures at each stage in the production cycle to aid corrective measures where variances arise (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.).

Streamline testing operations to ensure quality compliance for products destined for local or international markets, to allow foundries to access spectrometer and also to facilitate import of raw material (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.)

Build capacities for manufacturers to meet export requirements in terms of quality and production volumes through training involving Quality control and Quality assurance (Qc/Qa) and Good Marketing Practices (GMP). (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.)

Support on exposure to modern machines and technology through workshops, exhibition and discussions with foreign suppliers. (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.) SEDF is working in the similar field to upgrade technology and has created some linkages with a few institutions and organizations in Indian for ensuring incessant communication mechanism, however this could be taken to an advance level with collaboration to pertinent national institutions to arrange workshops, exhibitions and other meaningful events.

Set up a basic requirement of testing and control laboratory in Dhaka & Bogra and other districts which provide services in area of chemical composition analysis (spectrometer), physical properties testing (tensile test and Brinell hardness test), microstructure analysis, sand testing and heat treatment facility (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.).

Take facility from 5 BITAC (Dhaka, Chittagong, Khulna, Chandpur, and Bogra) (Implementation Partners: BITAC)

Develop quality gradually into world-class quality (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.

Requisition of Spectrometer, physical properties equipment and sand testing facilities for foundries for producing casting of international requirement. (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.)

Establish a common export-packing branch (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.).

Get Internet access – develop Light Engineering IT centres (Implementation Partners: BSCIC, BUET, BITAC, NPO, BPC, FBCCI, DCCI, Trade Bodies & Associations, Chambers, universities and institutions etc.)

Build a monitoring cell comprised of public-private partnership to monitor the initiatives taken to improve the technical capacity of the sector, this monitoring cell should be led by the private sector; SME Foundation, BSCIC, Investment Board etc. could be the potential partners for the monitoring cell

Develop quality management guideline for BITAC, BSCIC, NPO, RDA

Develop collaboration between academia and practical experienced people to improve the technology

Task 4: Marketing

To strengthen LEIs TSIs with marketing tools and techniques in order to develop and make visible LEIs national products on the domestic and international markets

This objective corresponds to facilitation of implementation of strategic marketing measures using advanced marketing techniques both for domestic and international markets. Establishment of display centers and proliferate international trade & export and to search for new markets.

Market data is widely available but the sources are widely fragmented and data poorly disseminated. Modern technology that readily allows instant availability is not fully utilized. Skills in interpreting data are lacking. Light Engineering expertise and feedback from overseas clients and embassies in key countries is lacking

Information and communication flows to local and export markets needs to be strengthened through database creation of exporters and buyers of respective products, information dissemination through market bulletins and information exchange, and exporters and manufacturer meetings

Effective export marketing and promotion are increasingly dependent upon establishing a brand image either individually or collectively. Trading platforms are always a place where relevant information and potential opportunities could come up and make export a success and a reality

Implementation Road Map

Make the products visible in the domestic and international markets

Establish a common export/marketing office/company

Establish a brand image either individually or collectively. Trading platforms are always a place where relevant information and potential opportunities could come up and make export a success and a reality…(Implementation partners: Min. of Industries, Min. of Commerce, Min. of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Adopt advanced marketing technique with commensuration of economical status of the target market…(Implementation partners: Min. of Industries, Min. of Commerce, Min. of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Investigate the possibilities to be supplier to different European manufacturer – start in small scale and develop this in a way that the Bangladesh manufacturer can take over more and more and maybe end up with manufacturing complete machinery for European exporters. This has been practised in many African countries and could also be adopted in Bangladesh. (Implementation partners: Min. of Industries, Min. of Commerce, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.).

Prepare better catalogues/ brochures in perfect English…(Implementation partners: EPB, NBR, SMEF, BUET, BITAC, BPC, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.).

Organise and centralise through EPB the collection of products of small enterprises in order to show them at the international fairs as the small entrepreneurs do not have the capacity to attend those kind of international events to showcase their products…(Implementation partners: Min. of Industries, Min. of Commerce, Min. of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Establish price preference for SMEs as practiced by India and other developing countries…(Implementation partners: Min. of Industries, Min. of Commerce, Min. of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.

Arrange for periodic/permanent exhibition of locally produced non-electrical and electrical machinery in the country…(Implementation partners: Min. of Finance, Min. of Industries, Min. of Commerce, Bangladesh Bank, Commercial Banks, Financial organizations, EPB, NBR, SMEF, BPC, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.). Ensure entrepreneurs participation in LE international trade fair (Implementation partners: Min. of Industries, Min. of Commerce, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.).

Access to market information and dissemination

Develop an information flow network to disseminate market, prices and technical information…(Implementation partners: Min. of Industries, Min. of Commerce, Min. of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Strengthen commercial representatives in the embassies in order to “sell” t5he LE products (Implementation partners: Min. of Industries, Min. of Commerce, EPB, SMEF, FBCCI and DCCI, Trade Bodies, Professional Associations, Chambers, etc.).

Organize and structure Market data access. The sources are widely fragmented and data poorly disseminated. Modern technology that readily allows instant availability is not fully utilized. Skills in interpreting data are lacking. Light Engineering expertise and feedback from overseas clients and embassies in key countries is lacking …(Implementation partners: Min. of Industries, Min. of Commerce, Min. of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Improve and strengthen flows of Information and communication to local and export markets through database creation of exporters and buyers of respective products, information dissemination through market bulletins and information exchange, and exporters and manufacturer meetings…(Implementation partners: Min. of Industries, Min. of Commerce, Min. of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Communication within the sector and with abroad

Contact and collaborate with foreign trade organizations through local associations (e.g. BEIOA) (Implementation partners: EPB, Min. of Industries, Min. of Commerce, Min. of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Develop locally CNG 3 wheelers and BITAC can take initiatives to develop the local expertise; this technology can be brought from India in order to create an import substitute.(Implementation partners: BITAC, Min. of Industries, Min. of Commerce, Min. of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Arrange regular meetings between Buyers and producers.

Implementation partners: Ministry of Industries, Ministry of Commerce, and Ministry of Finance, Donor agencies. 99% of locally made products are meeting the domestic demand but the existing local demand is much higher which is being supplied partially by the imported products at this moment, JICA has taken a similar initiative with a step further where they have conducted an extensive study on the domestic market comparing supply and demand capacity of the local producers and buyers. The finding then was disseminated among the pertinent parties for match making between buyers and sellers. This initiative has been an excellent start to foster growth of import substitute products' market, which in return will complement the export market to grow as the production capacity will increase and quality will be improved in time. (Implementation partners EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Design website for LE products, General entrepreneurs do not know who could provide them this kind of specialized services, hence, a cell could be opened to offer these services to entrepreneurs…(Implementation partners: Min. of Industries, Min. of Commerce, Min. of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Task 5: Policy Measures

To update and implement the Bangladesh LEI policies based on a public private dialogue in order to reduce import items, facilitate access to equipments and support export transactions

The objective targets to implement policy measures at macro level such as pro-LEIs industrial policy, export & import policy, tariff policy; raw materials & other materials procurement & supply policy, incentive policy, revitalize support institutional capacity, implementation of standardization & certification system; development of infrastructure, sectoral economic zone, interlinkages and networks.

Government, through the trade policy has a greater role to play to ensure that a stable macro-economic environment is created for businesses to thrive well and grow and assure foundries, manufacturers, retailers and exporters to have a long-term vision.

Implementation Road Map

Public Private Dialogue

Establish a public private dialogue allowing government and private sector to ensure that a stable macro-economic environment is created for businesses to thrive well and grow and assure foundries, manufacturers, retailers and exporters to have a long-term vision…(Implementation partners: Min. of Industries, Min. of Commerce, Min. of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Build a public private dialogue to improve the existing policy taking into consideration new elements such soft loan (low interest), incentives, taxes, etc. Develop national financing programmes for foundries and factories under specific conditions…(Implementation partners: Min. of Industries, Min. of Commerce, Min. of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Work closely with light engineering association in other countries…(Implementation partners: Min. of Industries, Min. of Commerce, BUET, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Strengthen institutional capacities and improve communication

Revitalize institutional capacity of associated support public/Government organizations such as BSCIC, BITAC, BMTF and EPB (Implementation partners: BSCIC, BITAC, BMTF, Ministry of Industries, Ministry of Commerce, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Develop communication and interaction between private sector, R&D Institutes and universities. Create internship…(Implementation partners: Ministry of Industries, Ministry of Commerce, Ministry of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Strengthen the institutional support for the further development of the industry (Implementation partners: Min. of Industries, Min. of Commerce, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Find alternative suppliers of raw materials in order to minimize the costs. If possible have always-alternative suppliers in order to avoid a breakage in the supply chain. (Implementation partners: Min. of Industries, Min. of Commerce, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Use provision on WTO rules of LDC…(Implementation partners: Min. of Industries, Min. of Commerce, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Make government to support Sector needs

Reform the existing policy and based on a public private dialogue develop a new one…(Implementation partners: Ministry of Industries, Ministry of Commerce, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Deliberate government policy to support activities to the sector. …(Implementation partners: Ministry of Industries, Ministry of Commerce, Ministry of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Introduce policy and mechanisms against dumping foreign goods…(Implementation partners: Ministry of Industries, Ministry of Commerce, Ministry of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Introduce rules for standardization…(Implementation partners: Ministry of Industries, Ministry of Commerce, BSTI, Donor agencies, EPB, SMEF, BUET & other Universities, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Develop an import policy for raw material…(Implementation partners: Ministry of Industries, Ministry of Commerce, Ministry of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Ensure better access of the enterprises to communications, water and especially energy supply. This requires efforts of the government and private companies in the corresponding sectors for infrastructure development and increase and uninterrupted service supply…(Implementation partners: Ministry of Industries, Ministry of Commerce, Ministry of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Facilitate import of raw material through incentives…(Implementation partners: Ministry of Industries, Ministry of Commerce, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Coordinate forecast of demand of steel…(Implementation partners: Ministry of Industries, Ministry of Commerce, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Quality raw materials and testing facilities: Government subsided on quality assurance facilities…(Implementation partners: Ministry of Industries, Ministry of Commerce, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Impose rule on trade license, awareness through workshops and seminars…(Implementation partners: Ministry of Industries, Ministry of Commerce, BSTI, BITAC, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Arrange financial support to arrange export promotion activities…(Implementation partners: Ministry of Industries, Ministry of Commerce, Ministry of Finance, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Establish Patent Right Act to protect the R&D cost of organizations that invest in R&D…(Implementation partners: Patent & Trade mark office, Ministry of Industries, Ministry of Commerce, BUET, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Revise policy that only allows steel mills to import scrap; it does not allow the manufacturers to import scrap and make dependent on the importers completely…(Implementation partners: Ministry of Industries, Ministry of Commerce, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

Facilitate import of reconditioned machines without tax for commercial purpose; sunset industries could be brought in our country at a cheaper price…(Implementation partners: Ministry of Industries, Ministry of Commerce, BUET & other universities, Donor agencies, EPB, SMEF, BPC, FBCCI and DCCI, Trade Bodies and Associations, Chambers, etc.).

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Volume-8

Bangladesh's ***Electrical & Electronics*** Industry, baseline, Profile, Performance, and Plans for Upgrading

K Siddique-e- Rabbani, Ph.D
CDS Team of Consultants
&
Naeem Chowdhury, Ph.D
CDS Team of Consultants

A study for SME Foundation, Dhaka

By

Center for Development Studies, Dhaka

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8.1 General introduction to the sector

Focus on intellectual capability first, then on skill and labour

Most of our present policies focus on the exploitation of cheap labour. We need to understand that such policies will never allow us to improve our economy and remove poverty. Actually, sustenance of poverty is a requirement for providing continuing cheap labour. Exploitation of cheap labour can only be a stop-gap arrangement, for immediate relief from dire poverty, but we should dedicate our maximum possible effort behind developing the technological capability in manufacturing enterprise, Electrical & Electronics sector being one of the most important ones for Bangladesh. The economically developed world thrives on innovation in technology, and unless we take the same route, we will be shackled to poverty for ever. In the modern world the economical return for technological intellect and skill are much higher than the return on labour, and for Bangladesh, this is the window of opportunity. We have a highly intelligent manpower which can produce high levels of technically intellectual output given the opportunity, and the skill of the people in these areas is also very high. We should import raw materials, or intermediate products, and by adding contributions from homegrown or acquired technology and skill, should produce finished products that can improve the quality of life of the local people at affordable prices. Such products are in high demand and sell at high prices all over the world, and we do not have to beg for special facilities or quotas from the rich world, rather, other countries will seek to procure such products on their own initiative. As mentioned above, our people have the intellect and skill to take up challenges to produce such products, and we should utilize these two, not only labour, as targeted in most of the present policies. Therefore, our economic policies should have a goal redefined by the above considerations.
The two sub-sectors under the Electrical & Electronics sector are introduced separately below, to highlight the inherent differences, which will be useful in the discussions later.

8.1.1 Electrical subsector:

8.1.1.1 Types of technology and products:

Most items in this sub-sector produced in Bangladesh may be listed under medium technology level. A general list of products is given below, with a short technical description of some of the processes involved.

a. Industrial:

1. Electrical cables
2. Distribution boards
3. Transformers, large & medium (for power distribution)
4. Switchgear, substation equipment
5. Electrical Arc Welding machines
6. Plastic moulding machine (manual types)
7. Enameled wires
8. Industrial fans
9. Control systems (temperature, speed, etc.)
10. Magnetic Contactor refurbishing
11. Porcelain Bridge connector
12. Various insulators
13. Main switch
14. Electric iron (cloth iron)
15. Electric soldering iron

b. Domestic:

16. Fans (ceiling, table, exhaust, etc.)
17. Tube light
18. Filament type light bulb
19. Light fittings, Table lamps, Pedestal lamps
20. Distribution board
21. Energy meter
22. Switch, plug, extension cord
23. Water heater
24. Flourescent light ballast, non-electronic
25. Fan and lamp regulator, non-electronic
26. Torch light
27. Refrigerator
28. Lift
29. Extension cords

8.1.1.2 Process Flow Description of Core Technology

The technologies are quite varied depending on the product.
a. Electrical cables: These are essentially made in medium or large industries with foreign technology. They draw out thin copper wires of different sizes from thick ones, either imported or recycled, twist a number of wires together, and cover the whole using a plastic resin, mostly PVC. However, small industries using indigenously made equipment are also manufacturing certain ranges of electrical cables. The quality of copper and of the plastic resin for insulation is important.

b. Fans: Ceiling fans are widely made in Bangladesh. These need quality silicon iron sheets and enameled copper wire for the electro-magnetic parts. The mechanical balancing, ball bearings are important elements and the shape of the blades play an important role in providing a good air flow. Exhaust fans are also made. However, table fans and wall fans require good quality plastic body and are not made in Bangladesh in general. However, some efforts have been made by a few industries in this direction recently.

c. Transformers and arc welding machines: For transformers, thin silicon sheets are cut to designed shapes using high quality punch and die to make up the core. Primary and secondary coils are wound on an insulated forma made up around the core, which are mostly done manually. Chemically insulated super enameled wires of specific diameters are used to wind the coils. The core sheets are fixed using nuts and bolts. At the end the transformer may be dipped in hot liquid insulating varnish so that the varnish enters into all the gaps and pores in the transformer to make it better insulated and mechanically rigid.

Mostly these are large and heavy items and the size and magnitude of the infrastructure is also demanding. These should have capacities to lift and manipulate such heavy items using overhead cranes and transporters. Most of these transformers use liquid coolants and need sealed outer encasing with adequate radiative cooling.
Electric arc welding machines are essentially transformers having various tappings. These are usually made in Bangladesh in a very crude way in open frames which may be improved in quality and outer looks.

d. Switchgear and substation equipment, distribution boards: These are more mechanical devices than electrical. However, the contact resistances are important and use of proper metals and their formulations are important.

e. Plastic molding machine (manual types): These have both metallurgical and electrical aspects. These are essentially ball presses with electrical heating. A good machine should have temperature and time control. Most of these machines locally do not have them. Safety aspects are also sometimes not properly looked into. There are two types – press mould for thermoset plastic where the heating should be around the mould itself, and injection moulding of thermoplastic materials, where the plastic is melted first and then pressed into a mould.

f. Switch, sockets and accessories: These are dependent on various technologies of making quality insulators and metal parts and contacts. Structural metal parts should have good springiness together with good electrical conductivity, and contacts should have low resistances. For the latter, the contacts are lined with silver or phosphor-bronze in good quality products. Bakelite is used as the insulator in most of these devices which is a thermoset plastic and moulded together with the metal parts if necessary. Observing foreign machinery, our local technicians have made the machinery necessary to make these devices locally. However, they lack in the knowledge of metallurgy and in electrical quality testing which is important to make good devices.

g. Light fittings: These items have more of design and aesthetic challenges and have to be adapted to the customer base. The technology involve those of glass, plastics and metals and are varied.
h. Lift: Recently some entrepreneurs have ventured into making some parts of lifts and its electronic controls. Safety is a big issue in this item.

8.1.1.3 Strength, weakness, opportunity, threat (SWOT) and constraints of the sector

A. Strength

1. Highly intelligent and skilled manpower can perform skillful manual operations to produce good quality items.
2. Local workshop expertise available for fabricating many of the process equipment that are mechanical and electrical in nature. Most of the existing micro and small industries depend on such equipment. However, some standard equipment like drills Hydraulic press, etc. are usually imported.
3. Producing quality products need measuring and calibration equipment which are expensive if imported. Expertise to develop such equipment (which are mostly electronic) at low cost exist within the country, which if tapped, may result in significant improvement in quality.
4. Large domestic market.
5. Existence of an efficient chain of independent marketing network for reaching the whole of the country.
6. Low labour cost.
7. Experienced labourers can form new enterprises after they have learned the skill.
8. Indian products that are marginally better than local ones have occupied a substantial market in Bangladesh. This market can be taken up by the local industries through taxation policies, and achievable improvement in quality.

B. Weakness

1. Existing Government laws relating to tax and VAT at production level, where corruption is also rampant at collection leading to harassment, discourages enterprises expose themselves through exhibitions and advertisements, and in establishing own brands. This keeps them under the control of the distributors, which inhibits efforts to enhance quality.
2. Since VAT is complex, small industries cannot comply with the requirements. They prefer an overall turnover tax which is simple. However, since the Government puts a very low ceiling of turnover (Tk.24 lakh per annum in 2008 budget, was less before) to avail of this facility, this discourages growth.
3. Most of the entrepreneurs lack formal education and training in the related fields, and they lack in adequate scientific and technical knowledge. Therefore they cannot improve quality beyond a certain level. Of course expertise is available within the country, but combining them has not been possible in the past.
4. Do not have adequate funds. Entrepreneurs do not know about collateral free loan providers. Since banks usually ask for collateral, even if instructed by the Government otherwise, most entrepreneurs avoid banks.
5. Majority do not have proper accounting knowledge required for project evaluation, pricing, etc. This may result in failure of an enterprise, particularly when receiving loans.
6. The independent marketing network is beyond the control of the enterprises. The distributors play a big control over the manufacturers so that their profitability and cash flow is eroded.
7. The pressure from the distributing firms for greater margins to themselves and lack of consumer awareness leads to cheaper and low quality products flooding the market, even though capability exists for producing better quality items. Thus bad products drive good products away damaging the reputation of local products. This eventually makes road to import of better quality foreign products.
8. Attitude of customers to go for foreign products, thinking that quality products are not produced in own country. This also results in manufacturers putting labels of foreign brands on local products for easy marketing which ultimately goes against their own growth.
9. There is a high end market in the country where quality rather than price is sought. However, it would be difficult for micro and small manufacturers to enter this market unless quality brands are established.
10. Government is a big purchaser in the country. Vested interest groups manipulate policies to make it difficult for local products to enter.

C. Opportunities

1. A large domestic market exists for low priced products, which is increasing gradually as people come out of poverty through various Government and Non-Government initiatives.
2. The customers are not yet conscious about consumer rights. This is helpful for start-up enterprises.
3. If the Government policies regarding tax and VAT can be changed so that corrupt officials cannot disturb and harass the entrepreneurs, some enterprises will come out of the shell by trying to improve quality, advertising, and establishing brands. This will initiate a healthy competition, and eventually expertise available in Universities will be sought to improve quality. When quality improves, a large export market, both in the Economically developing countries and in the Economically Advanced countries, can be tapped as well.

4. If favourable policies are adopted (as suggested above) youths with technical education will enter this arena. This will pave the way for producing high quality products in large quantities in the country, both for domestic consumption and for export.
5. Government can be induced to make purchases from local manufacturers through appropriate lobbying, public opinion formation, with eventual formulation of rules.

D. Threat

1. Better quality products from India and China at reasonable prices.
2. Possibility of dumping from these countries when local producers try to improve quality.
3. Unfavourable Government policies may be taken up due to lobbying of powerful vested interest groups when the local entrepreneurs become a challenge to imported products – both in quality and in price. (This has happened many times in the past, and is happening still now, which is a serious issue and needs to be resolved). The threat comes in the form of regulations of tax, quality, labour law compliance, environmental clearance, etc.
4. Most of the products depend on imported raw materials. A large scale disruption abroad may affect the local production.
5. Interruption in the services of energy – electricity and gas – causes a major setback.

8.1.2. Electronics subsector

8.1.2.1 Type of technology, product description

The products under this subsector may be broadly divided into two categories:

A. Items using foreign technology (assembly industry)

1. Radio, Television, Cassette recorder, etc.

B. Items using locally developed or acquired technology

This is a highly potential sector for Bangladesh as the mental abstraction needed to understand the inner working of electronic devices and circuits is special and unseen. Somehow the people of Bangladesh are very good at mastering this technology and its art. This sector also gives the opportunity for educated innovators to turn into entrepreneurs, which could have really taken Bangladesh into a highly competitive position in the world economy. Through decades, such talents have produced proofs of innovation, right from simple circuitry to complex computerized instrumentation. However, because of a lack of appropriate environment, mostly due to lack of Government vision and faulty Government policies, these efforts do not end up in successful enterprise, which again work as a discouragement for the would-be innovative entrepreneurs. In the following lists products that have been already been designed and developed in Bangladesh for commercialisation attempts are given. However, only a few products like Voltage Stabilisers, Protectors and UPS/IPS have got wide commercialisation, which again declined in the last decade because of faulty taxation policies. The others have remained as occasional efforts because of the above impediments, mostly. Here the main items can be divided into the following three categories.

a. Items for general consumer use

1. Voltage Stabilisers with or without built-in Voltage Protectors
2. Voltage protection devices (Volt-Guard)
3. Emergency (Instant) power systems (IPS) with battery back up
4. Electronic Light dimmer, Fan regulator
5. Surge Suppressors
6. Audio Amplifiers
7. Emergency charger light
8. LED for domestic lighting, particularly in rural areas.
9. Uninterruptible Power Supply for computers with battery back up

b. Items for specialised professional, industrial, medical and educational use

1. Charge Controller for Solar Photovoltaic system
2. Inverter for Solar Photovoltaic System
3. Moving message display
4. Microprocessor controlled Prepaid Electric Energy-Meter
5. Hi-Fi audio system
6. Public Address system
7. Micro-controller/ Microprocessor trainer system
8. Trainer board for general electronics teaching
9. Trainer board for teaching Radio, Television
10. Muscle & Nerve Stimulator
11. Iontophoresis equipment for treatment of excessive sweating
12. Computerised EMG/EP equipment
13. Computerised on-line ECG Monitor
14. Industrial temperature controller
15. Electrical Energy Meter calibrating equipment
16. Electronic Scoreboard (computerized)
17. Traffic Light (using micro-controller)
18. Automatic light sensitive switch
19. Taxi meter (using micro-controller)
20. pH meter
21. Conductivity meter
22. Radiation Survey meter
23. PABX system
24. Conference audio system
25. Computer interface trainer system
26. Computer/microcontroller controlled voltage Stabiliser
27. Computer Control Teaching system for children
28.

c. Components and support items for electronic manufacture

1. Printed Circuit Boards (PCB)
2. Transformers
3. Cabinets

Process Flow Description of Core Technology

A. Items using foreign technology (assembly industry):

This is applicable mainly for Radio, Television, Cassette Recorders, etc. which are usually sold in large volumes globally. All the necessary components and parts of a product are available in a single packaged kit, usually imported. The entrepreneur does not need to have high technical expertise. The technology is developed by somebody else. Ready made printed circuit boards (PCB) and all electronic components as well as the cabinets, nuts and screws are all packaged into the kits. This industry mainly exploits the cheap labour, most of which is semi-skilled or unskilled. Some knowledge of technology is needed only in quality testing of the finished equipment and its repair, if needed. Computer monitors have a similar technology as that for Television, but this could not flourish because of import duty waivers on Computers since 1998.

The following is the flow process of a single product. The parts and components in a batch of incoming kits are randomly tested by a qualified technician and stored. On the fabrication day, the parts are separated according to the sequence of assembly and are distributed to the workers appropriately by a technically skilled person. Firstly electronic components are stuffed into the PCB according to the given plan. There may be a quality control (QC) check at this point. The stuffed PCBs are then either manually soldered in a small industry or dip soldered in a slightly bigger enterprise. For a very large industry, a massive 'wave soldering machine' may also be used. They may also use automated robot assisted stuffing and placement in wave soldering tanks, but these are not appropriate for industries in Bangladesh at present. There may be one or more runs with PCB stuffing and soldering depending on the size of the components, starting with the smaller ones. Again a QC stage ensures working of the finished PCB. Then the PCB and other parts like transformers, switches, potentiometers, fuse, etc. fixed inside the cabinet and necessary connections are made. A QC at this stage gives an almost final hint of the success of the assembly. Various adjustments of variable components like preset potentiometers are made for the proper functioning of the device. Its functions are also tested at this stage using various testing apparatus. Then the cover of the cabinet is fixed and a final QC is made, where the whole equipment may be taken through practical shaking and jerking etc. to mimic practical handling situations. If successful, this is then packed into cartons with various manuals and documentations, ready for delivery. If the equipment fails at any QC stage, it has to be taken through repair and repeat QC at the appropriate stage.

B. Items using locally developed or acquired technology

At the production stage of a product which sells in large volumes, the process is almost the same as that for an assembly industry as mentioned before, except that some large components like transformers, or parts of the cabinet, or printing and labeling of the cabinet are either done in-house, or done through a backward linkage (subcontracting). However, before reaching such a stage a manufacturer has to go though a development stage as described below, and for reasons stated below, a small industry has to maintain a continuous process of R&D, either for developing a product to its maturity, or in evolving a product to different variations in size, capacity, and sophistication. Besides, it has to keep innovating newer products in order to stay in competition and to grow. This is applicable for most of the Electronic industries in Bangladesh, and elsewhere in the world, and therefore, the process of R&D is also to be considered a part of the process flow, that differentiates an innovative small industry from the others. It is the small industry having a strong innovative R&D base which is to get priority in any policy development.

1. R&D for developing a product: This is needed if a product has to be developed from scratch, from an innovative idea of the product designer. Even if someone copies a product made by others, some R&D process cannot be avoided (this is sometimes called “reverse engineering”). R&D involves three main parts: i) designing of the circuitry for a particular product (which may be innovative, completely from scratch, or may be a copy of an existing product), ii) designing a Printed circuit board (PCB), and iii) designing a decent user friendly cabinet. One also needs to write up user manuals and design a good packaging for the product. In copying a circuitry, usually all the components used by a foreign product may not be available locally, so one has to improvise and modify the circuit depending on availability of components, and that needs a minimum of knowledge, expertise and experience, which essentially becomes R&D. Printed circuit boards can be designed using computer software, or drawn by hand, and most manufacturers are opting for the former nowadays. The PCBs are produced through screen printing technology and etching of copper boards. For sophisticated very fine resolution PCB’s photographic techniques are necessary, which also demand the use of a double sided PCB with interconnection between the two sides at certain designed points. Finally, the design of a cabinet which is user friendly as well as decent to look at, and cost effective is also a vital part of the R&D.

2. Field trial: After a successful R&D, a product has to be taken through an intense field trial, which usually gives rise to further modifications and changes in design.

3. Trial manufacture and marketing: Passed on through the field test a product is manufactured in limited volume and marketed. It needs a very close monitoring for feedback, and may necessitate further changes or modifications in the design. A product may not ‘catch’ the market, and may have to be dumped altogether. If there is indication of a large demand, this may bring the entrepreneurs to invest more for an alternative design of the whole product.

4. Continuous process of custom design: For small scale manufacturers (usually the case for most Bangladeshi enterprises), the product range has to be large to satisfy varied demands of the customers. Even then some customers may demand individual variations and continuous R&D is needed. Again, all small manufacturers procure components from local retailers and it is very difficult to obtain the same components every time these are purchased. So, sometimes they need to maintain continuous R&D to accommodate slightly different components into the design of the same product.

C. Components and support items for electronic manufacture

The three items mentioned under this heading are PCBs, transformers and cabinets.

C.1. Printed Circuit Boards (PCB)

Printed circuit boards form the basic structure of an electronic product. Once designed, this has to be made in large numbers either in house, or through subcontracting. As mentioned before, the PCBs are produced through screen printing technology and etching of copper boards. For sophisticated very fine resolution PCBs, photographic techniques are necessary, which also require the use of a double sided PCB with interconnection between the two sides at certain designed points using a separate technique. Although fine double sided PCB’s are being made locally using screen printing techniques, through the use of highly skilled manpower, technology needed for the interconnections is not yet available. One firm is trying to set up a modern multi-level PCB manufacturing plant, but has not been able to provide regular services as yet. Unless one gets sufficient order volumes, such a PCB plant is not commercially viable.

C.2 Transformers

We would consider small transformers that are used within the packages of an electronic device under this heading. Larger transformers that are used for electrical power transmission and distribution described before are not considered under this heading. For transformers, a manufacturer has to obtain thin silicon sheets, cut them to designed shapes using high quality punch and die to make up the core, insulate the sheets using thin layers of insulating varnish or paint. Primary and secondary coils are wound on a plastic forma in a coil winder machine, which can be manual or automatic. Chemically insulated super enameled wires of specific diameters are used to wind the coils. The ends of the coils are fixed using adhesive tapes, and the windings are covered using paper tapes. Now the thin silicon sheets are introduced into the plastic forma and tightly packed. They may be screwed tightly using nuts and bolts in case of comparatively larger transformers. Finally the transformer may be dipped in hot liquid insulating varnish so that the varnish enters into all the gaps and pores in the transformer to make it better insulated and mechanically rigid. Labels are attached, and it is then passed through a QC stage and packed into cartons if successful.

C.3 Cabinets

This is a very important part of equipment as it has to provide the user interface to the device. It has to be functional and user friendly, as well as decent and sturdy enough to protect the parts and components inside. It has also to provide air flow for cooling of hot parts inside, either through natural heat dissipation or through forced cooling. Most of foreign equipment have plastic cabinets nowadays, but unless the production volume is very large, running into hundreds of thousands of the same equipment, plastic cabinets are not commercially viable as mold making is very expensive. Products selling in smaller volumes mostly depend on metal sheet cabinets that are worked manually, or through a semi-automatic process. The latter, however, is not the case in Bangladesh.

Strengths and constraints of the existing technology in Bangladesh

The main advantage of electronics sector is that a minimum investment is needed on fixed equipment to initiate an enterprise at a very small level. Here lies the strength of this sector. Basic components like resistors, capacitors, transistors, IC's, etc. are available widely over the globe and Bangladesh does not need to go into the production of these basic components. These have to be produced in millions to be commercially feasible, and depending on various factors a handful of countries have got the situations right to produce these items. Since to survive, these companies have to sell their products in millions, there is hardly any chance of restrictions on the supply of these components. This sector in Bangladesh produces finished products which go directly to consumers, so has the potential of giving the producer a maximum cash-gain with minimum investment. Besides, electronic products enhance the quality of life in the modern life, and local production allows such products to be made available in the market at affordable prices, in this age of global economic disparity.

A small industry may start with only a few thousand taka worth of tools and equipment like Soldering iron, multi meter, desoldering tool, assorted hand tools and drill machines for mechanical fixing, etc. It can depend on backward linkage for PCBs, transformers and cabinets, therefore requiring a small space and a small number of workers. What it needs is mainly running capital and a good marketing strategy.

In Electronics Bangladesh is fortunate to have quality personnel, and there is no problem with acquisition of higher technologies. However, improvement in technology can only happen through selling, feedback, and continuous R&D. As more and more people purchase a product, weaknesses of the technology are revealed and the innovator can improve the quality further. As the demand for a product increases, the designer can add more features, and can go for better technologies and quality of components requiring higher investments. At the initial stages some patience is required from customers. While this patience is observed from private individuals in our country, it is not so from Government organizations and large corporate bodies, which want to play safe in their procurement by purchasing foreign brands with a good reputation. Besides, personal benefits offered by foreign companies and their agents are also determining factors in such procurements.
The strengths, weaknesses, opportunities and threats (SWOT) relating to this sector is summarized below.

A. Strength

1. Bangladeshi people have a strong mental ability to visualise the actions of unseen abstract designs as demanded by Electronics. In other words our people have a natural ability for electronics which gives it a strong advantage over many nations.
2. This sector has been initiated by relatively educated group of people, particularly people with science and engineering background. This is a good sign for potential product innovation and quality. Mostly innovators have turned into entrepreneurs. This is behind all significant industrial growth in the global history.
3. Workers are easy to train since they have a matching intellect and skill. They can produce high quality products given necessary facilities and incentive.
4. Potential exists for high quality indigenous product design. Existing local products are better in quality than many items imported from neighbouring countries, which is the reason for their survival in spite of negative Tax and VAT policies favouring import of finished products.
5. Needs a very small fixed investment.
6. Products needed for calibration or automation of other process industries can be designed and fabricated.
7. Local support industries for transformers and cabinets help reduce the cost of products. (Transformers are relatively heavy, and cabinets are bulky, so freight charges in import is high for both these items). In spite of lack of required infrastructure for producing world class cabinets, innovative use of existing capabilities have produced designs that are reasonable, and better than those produced in many existing exporting countries.
8. Existence of large domestic market, if properly tapped, and if at least a level playing ground is provided against similar finished imported products. (at present the grounded is tilted against local production, in favour of import of finished goods)
9. Scope for innovating products matching the needs of local population. Customer design is possible if an innovator becomes an entrepreneur himself. This is also one of the reasons for survival of such groups in spite of fierce competition from cheaper and better looking products from abroad.

10. Some local products are better in quality and service, compared to imported products. Particularly, local Voltage Protectors and Stabilisers are better suited to our conditions than the imported ones.

B. Weakness

1. Needs a large working capital.
2. Lack of infrastructure for fabricating high quality cabinets. World-class cabinets mostly use plastics or die shaped sheet metal. Both of these need huge investments and are economically viable for a very large volume for each individual product. Since the existing volume is small the necessary infrastructure has not grown in Bangladesh so far.
3. At a very small scale the industry is very profitable, as marketing is limited within acquainted people around. As soon as one wants to grow to middle tier, marketing becomes difficult as it needs going beyond personal acquaintance level. Showrooms and sufficient advertising are needed, which needs a large working capital, and it takes a while to catch on. Besides, fearing harassment from Government officers, enterprises tend not to advertise and go for distributing their products through other dealers. This allows the dealers to have an upper hand and thus reduce the profitability of this industry. The manufacturers do not get the price regularly and this sector suffers from cash flow crisis.
4. Because of this control of wholesale traders and dealers, technological quality keeps going down since the dealers insist on lower and lower costs. Without self branding, and advertisements, there is no motivation and scope for improving technology.
5. Because of low volume, manufacturers cannot import components directly from component manufacturers abroad. They have to depend on the components brought in by bulk importers. This leads to some reliability problems. Besides, minor design changes have to be made for each batch if components are not available to exact specifications. This needs the presence of an expert in every industry which is based on local design.
6. The above is not a problem with Radio and Television assembly industry since they get all their parts and components in a kit form. However, such assembly-only industries do not build up local technological capability and cannot grow, and are more vulnerable to Government policy changes (wrong import duty regimes in 2002 saw the destruction of this assembly industry within one year, while in spite of more severe reverse duties imposed in 1998, firms could sell locally made UPSs till a few years back, and can still sell IPS, voltage protectors and Stabilisers)
7. Existing Government laws relating to tax and VAT at production level discourages R&D since it adds to the cost of the products, thus essentially taxing R&D. This goes against improvement of technology.
8. Attitude of customers to go for foreign products. (However, efforts of some capable innovators turned entrepreneurs have changed the scenario to a great extent. People have now more reliance on some domestic electronic products.)
9. Government is a big purchaser in the country. Vested interest groups manipulate purchase procedures with illegal behind the scene negotiations, where quality is sacrificed for kickbacks. This results in a race which results in quality deterioration.
10. Government purchases often favour foreign products, categorically mentioning places of origin excluding the local ones, even in cases where local products have demonstrated their quality and reliability. This is because of personal benefits to decision makers offered by rich importers with foreign collaboration, which cannot be matched by local industry.

C. Opportunities

1. A large domestic market exists for low and medium priced quality products, which is increasing gradually as people come out of poverty through various Government and Non-Government initiatives.
2. The customers are not yet conscious about consumer rights. This is helpful for start-up enterprises.
3. There is ample scope for export. The quality of some of the local products is already of international standard. In fact some products that are imported into this country are inferior to local products.
4. If the Government policies regarding tax and VAT can be changed so that corrupt officials cannot disturb the entrepreneurs, some enterprises will come out of the shell by trying to improve quality, advertising, and establishing brands. This will initiate a healthy competition. When quality improves, a large export market, both in the Economically developing countries and in the Economically Advanced countries, can be tapped as well.
5. If favourable policies are adopted (as suggested above) more youths with technical background will enter this arena. This will pave the way for producing high quality products in large volumes within the country.
6. Government can be induced to make purchases from local manufacturers through appropriate lobbying and public opinion formation.

D. Threat

1. Cheaper and better looking, not necessarily of better quality, products from China.
2. Possibility of dumping from these countries.
3. Unfavourable Government policies already exists against local products, and may continue in future due to lobbying of powerful vested interest groups, mostly importers.
4. Most of the products depend on imported raw materials. A large scale disruption abroad may affect the local production, though it is a remote possibility in the present day world.

8. 2 Analysis of first-hand survey data

With the above backdrop, this report is going to analyse the survey data obtained first hand through the SMEF initiated project of 2006-2007, and carried out by CDS. Unless otherwise stated, the source of all information in the tables provided in this report is this first hand survey.

8.2.1 Structural, geographical and gender distribution

Table 5.1 summarises the structures of the sampled firms. The structural definitions are given at the end of the table, including an alternate definition of Mi-Small and Me-Large which combine two each of the traditional nomenclatures. Table 5.2 gives the gender structure and experience while Table 5.3 gives a geographical distribution of the sampled firms. One of the industries studied (Government funded Eastern Cables) was too large compared to others and it tended to distort the average representative picture. Therefore it was omitted from the evaluation later and is not included the analyses that are presented here.

Table 5.1: Structure of sampled firms under Electrical & Electronics Sector

Size class	No of firms	Average employment per firm			Employment size per firm (All worker)
		Production worker	Others worker	White collar worker	
Micro	25	4.96	.04	1.25	6.25
Small	86	19.60	.69	3.61	23.91
Medium	15	55.76	3.24	6.76	65.76
Large	12	157.58	2.58	10.33	170.33
Mi-small	111	16.38	.55	3.09	20.02
Me-large	27	97.90	2.97	8.17	109.03
All	138	33.51	1.06	4.16	38.72

Source: SMEF Survey, 2008

Table 5.2: Gender distribution of workers and their experience

Size Class	Average no.of workers per firm			Female to male ratio within size class	Average experience, years		
	Male worker	Female worker	All		Male worker	Female worker	All
Micro	6.21	.04	6.25	0.01	2.59	.29	2.59
Small	20.80	3.11	23.91	0.13	1.25	.81	1.22
Medium	54.18	11.59	65.76	0.18	.49	.56	.46
Large	132.83	37.50	170.33	0.22	.27	1.49	.26
Mi-small	17.59	2.43	20.02	0.12	1.54	.70	1.52
Me-large	86.72	22.31	109.03	0.21	.40	.95	.38
All	32.12	6.61	38.72	0.17	1.30	.75	1.28

Source: SMEF Survey, 2008

An interesting observation in Table 5.2 is that the percentage of female workers increases with the size of the firm. This may be because most of these technology based enterprises are initiated by male entrepreneurs, and it is only when the size increases that one finds the advantage of employing women work force. A similar pattern is also reflected in the experience columns. Table 5.3 gives a geographical distribution of the enterprises surveyed under the present programme. Dhaka and Chittagong have the most concentration of industries in the Electrical & Electronics sector and the results would therefore be well representative of the whole country.

Table 5.3: Geographical distribution of sampled enterprises

	No. of establishments
Dhaka	119
Chittagong	17
Narayangonj	2
Total	138

Source: SMEF Survey, 2008

Table 5.4 summarises the age of the enterprises and the education and training aspects of the entrepreneurs.

Table 5.4: Age of enterprise, education training of entrepreneur

Firm size class	Average years since unit was set up	Average years of formal education by the entrepreneur			% with any specialized training	Average duration of such training (No. of years)
		Mean	Standard deviation	Coefficient of variation (%)		
Micro	8.32	9.72	4.35	0.45	20	0.16
Small	12.59	11.44	4.96	0.43	8.1	0.08
Medium	13.60	11.87	5.33	0.45	0	0
Large	13.54	11.92	6.41	0.53	0	0
Mi-Small	11.63	11.05	4.87	0.44	12.6	0.09
Me-Large	13.57	11.89	5.74	0.48	0	0
All firms	12.02	11.22	5.04	0.45	7.9	0.08

Note: By specialized training, we mean particularized diplomas that upgrade specific vocational or industrial or technological skills in the trainees. For example, the questionnaire asked: "Did the Managing Director obtain a Masters or Diploma in relevant Technology?"

Source: SMEF Survey, 2008

Table 5.4 shows that the Mi-Small establishment has an average age of 11.6 years, while the corresponding average for the Me-Large establishment is 13.6 years which are not too different. This also poses an important question. **What happened to enterprises that were set up in the seventies, eighties or early nineties?** From experience it is known that in the eighties a large number of small industries were set up due to some facilitating policies taken by the Government. Most important of them all was the waiver of the requirement of registration in the Industrial Policy of 1986[1]) (1: Ministry of Industries booklet, Govt of Bangladesh, 1986). The above data indicates that almost none could survive the onslaught of time. The reasons behind such a gloomy picture needs to be analysed in a bit of depth, and will be discussed later.

Secondly, although the average educational attainment of Me-Large establishment (of 11.9 years of schooling) slightly exceeds the corresponding attainment of the Mi-Small establishment (of 11 years of schooling) almost 12.6% of the Mi-Small entrepreneurs had specialized training compared to none in the case of Me-Large. This again points to an important finding; some **Mi-Small enterprises have entrepreneurs with technical background which is an important ingredient to the industrialization of the country**. Such entrepreneurs (or technopreneurs) need special nurturing and support in the interest of the nation.

8.2.2 Financing start-up capital involvement: magnitude, external and internal reliance

We start now with the economic circumstances of their mobilization of the start-up head-count, scale of operations and the manner in which they had mobilized their start-up capital. The results relating to these aspects of the narrative are presented in tables 5.5 and 5.6 below.

Table-5.5 Start-up economic circumstances

Firm-size	No. of start-up		Total capital (in '000 Tk)	Loan, as % of total start-up financial capital (Tk. 000s)			
	Employ-ees	machines		Bank loans	Non-bank loans	from friends, relatives	All debt
Micro	6.88	1.92	309.7	0.00	0.00	9.04	9.04
Small	15.09	5.82	1607.4	0.31	0.72	8.08	9.11
Medium	20.93	24.07	2599.2	4.62	0.00	0.82	5.44
Large	49.23	12.85	2577.2	9.70	0.00	2.59	12.29
Mi-Small	13.24	4.96	1328.9	0.29	0.68	8.05	9.02
Me-Large	34.07	18.67	2585.5	6.88	0.00	1.60	8.48
All	17.44	6.96	1605.7	2.36	0.45	5.87	8.68

Source: SMEF Survey, 2008

It can be observed that enterprises in both medium and large categories started up in the previous category, i.e., there had been positive growth in these enterprises. On the other hand, both micro and small categories started up in the same category. Of course in the small category there was still plenty of room for growth without change in category (up to 49 from start-up figure of 21), but for the micro category there was hardly much room for any growth (up to 9 from 6.9). This implies that the micro category of enterprise, which can be said as the backbone of industialisation, is not growing as expected, and one needs to find the reasons.

The number of machinery in large establishments is less than that in a medium establishment at start up. This could be due to utilization of low capacity manual machinery by the small and medium establishments, and there needs to be more units for increased production. On the other hand, the large industries usually go for high capacity automated machinery whose number is therefore, not too many.

Mobilisation of start-up capital also gives an interesting picture. Small enterprises have about five times that of the micro, which is reasonable, but both medium and large enterprises have almost the same start-up capital which is surprising, and this again is only about 1.6 times that of the small enterprises. This suggests that medium enterprises are at a disadvantage when compared with others.

Looking at the debt fraction at start up, no enterprise of any category gets more than 10% of their start up capital from any sources of debt, except for large enterprises, which again gets marginally more, 12.3%. Micro enterprises do not get any loan from banks or from non-bank institutions. Friends and relatives form their only source of loans. Small enterprises can get a little from bank and non-bank institutional sources, however, that amount is meagre, about 1% of their requirements. Medium enterprises get a better share from banks, however, the proportion is again insignificant at about less than 5%. Even large ones do not get more than 10% of their requirements from banks. It also shows that medium and large ones can get a little from the banks and takes less from friends and relatives. However, one picture stands out: equity financing is the major contributor, i.e., the entrepreneurs have to depend on their own resources. Separating out formal bank loans, micro enterprises receive nothing from banks, while small, medium and large enterprises receive about 0.3%, 4.6% and 9.7% respectively of their requirements from banks. On the whole Table 5.5 indicates that the role of formal lending organizations in the electrical & electronics sector of the industry in the country is very small.

Table 5.6: Firm receiving debt-finance at start-up

Farm status	no. of firms receiving debt-finance	no. of firms not receiving debt-finance	Within each category	
			% receiving debt-finance	% not receiving debt-finance
Micro	15	10	60.0	40.0
Small	72	14	83.7	16.3
Medium	15	0	100	0.0
Large	10	2	83.3	16.7
Mi-small	87	24	78.4	21.6
Me-large	25	2	92.6	7.4
All	112	26	81.2	18.8

Source: SMEF Survey, 2008

Table 5.6 alone tends to present a wrong picture that most of the enterprises are dependent on debt financing (whether from banks or friends and relatives). It has to be studied together with Table 5.5, which shows that the debt amount is only about 10% of the total fund requirement, therefore, debt received in any category in Table 5.6 does not indicate significant reliance on debt financing. Again, whatever is the percentage of contribution, debt financing is the least for the Micro enterprises, which is well understood, as banks or friends & relatives do not have much confidence in start up entrepreneurs of this category, and they have to take risks on their own.

Business model differences: own-account producers versus contract manufacturers

Table-5.7 presents the relative prominence of establishments with different business models. We distinguish between two major categories of establishments, namely, (i) those which rely solely on own-account production, and (ii) those which rely solely on contract manufacturing. The third group is a mixed one, following both of the above models.

Own-account producers (OAP) are those enterprises which implement each of the stages of the life-cycle of being a manufacturer: designing products, calculating addressable markets and the size of production batches, buying raw materials, accessing finance, setting the price, and being responsible for marketing what is produced. If it can do all of the above efficiently, minimizing the costs and maximizing the sales, it will be in the black, and make money. The distinguishing characteristic of this business model is that the entrepreneur takes all the risks and pockets all the difference between the revenue and his costs. On the other hand, contract manufacturing (CM) is a business model in which the manufacturer essentially works as an agent of a third party. The latter issues to the former the specifications of the products and the quality standards, and pays it a manufacturing charge. The CM has to buy up the needed supplies of raw materials and accessories. A variation on the above theme is that the third party also procures the essential raw materials and supplies them to the contract manufacturers' (CM's) premises, and agrees to buy up to an agreed overall quantity subject to quality standards. In this case, of course the third party sets a lower price. The advantage to a CM is that it does not have to worry about buying supplies and taking the risks of marketing the product. The disadvantage is that the CM has to run very efficiently in order to keep a margin of profitability. Of course there are 'mixed' business models where both own account production and contract manufacturing is performed.

Table 5.7: Own-account production versus contract manufacturing

Size class	Percentage of all establishments in sample	Percentage of establishments within each size class that are in		
		Own account production	Contract manufacturing	Mixed Manufacturing
Micro	18.1	68.0	8.0	24.0
Small	62.3	77.9	4.6	17.4
Medium	10.9	86.7	6.6	6.6
Large	8.7	91.7	0.0	8.3
Mi-small	80.4	75.7	5.4	18.9
Me-large	19.6	88.9	3.7	7.4
All	100.0	78.3	5.1	16.7

Source: SMEF Survey, 2008

Table 5.7 suggests that between OAP and CM, OAP is the dominant one for all size classes, from about 68% for micro enterprises to about 92% for large enterprises. Therefore, unlike some other sectors like designer goods industry where CM is the dominant one, electrical & electronics sector is predominantly OAP. Again, it is natural to expect the large industries to have more dominance in the market and therefore, having more contribution of OAP. Entreprises depending on both OAP and CM, i.e., mixed business mode, are more on the Mi-small sizes and less on Me-Large. This variation is expected based on the reasoning mentioned above.

Besides the above three dominant types, a fourth business model has emerged, particularly in the electronics subsector. Due to certain ill advised Government policies at different times, products that were made or can be made locally, have been made duty free at import. This applies to UPS for computers and battery charge controllers and inverters of solar photovoltaic panels which were made duty free in 1998. This has taken the business out of the producers and has placed them in jeopardy. In order to survive after investing so much money and effort, such enterprises have no other alternative but to resort to importing such products and use trading to supplement their income. Since trading brings more easy income, gradually such enterprises turn fully into trading unless the entrepreneur has a particularly strong commitment to local production.

8.2.4 Principal products and by-products

Table 5.8 presents the average number of products and by-products manufactured by a single enterprise.

Table 5.8: No. of products

Size class	Average no. of products	Average no. of by-products
Micro	1.63	0.00
Small	1.79	0.03
Medium	1.46	0.07
Large	1.54	0.00
Mi-small	1.75	0.03
Me-large	1.5	0.04
All	1.71	0.03

Source: SMEF Survey, 2008

Table 5.8 suggests that the number of products produced by each enterprise is less than 2 in number. This is a bit surprising at first, in view of the long list of products in this sector given in the beginning. One has to realize that manufacturing and marketing of any new product is difficult and challenging, and one has to face many odds, particularly in Bangladesh. A prototype cannot be put on the market immediately, it has to go through field trial, industrial design, trial marketing and so on, as discussed before, all of which need money, patience and support of the market and the Government. The taxation policies, particularly VAT policies and its administration formalities discourage introduction of new R&D based products which will be discussed more later. Therefore, the range of products listed in the beginning has not contributed significantly to the market place. Again, technology innovators who turn themselves into entrepreneurs (technopreneurs) are few in Bangladesh. Overall, the environment is not conducive to attract such technopreneurs. Majority of the enterprises are set up by less innovative entrepreneurs, who usually learn the techniques and the trades from their job experience in another enterprise, and usually settle in for one or two products for which a large market has already been created.

By-products are negligible in this sector, since the nature of this industrial sector is to use semi finished parts and components as raw materials to make finished products. Therefore, unlike chemical industries which may produce significant by-products, electrical and electronics sector has almost none.

Table 5.9 reports scale of output per establishment and the value of gross output of the sample establishments arrayed in order of their size, ranging from micro to large.

Table 5.9: Differences in scales of output between own-account production versus contract manufacturing in 2007

Firm size classes	Average scale of output per unit engaged (in physical units)			Gross value of output per establishment (Tk 000s)		
	Own-account production	Contract manufac-ture	Others	Own account producers	Contract manufacturers	Others
Micro	16389	505	3264	7708	356	2654
Small	27468	35646	15474	22441	43934	26017
Medium	32566	25245	31746	20629	22522	24650
Large	83729	0	103176	84497	00	84932
MiSmall	25226	23932	11986	19459	29408	19342
MeLarge	56016	25245	67461	49900	22522	54791
All firms	32068	24120	16810	26224	28424	22424

Source: SMEF Survey, 2008

It can be seen from Table 5.9 that contract manufacturing brings less output per establishment compared to Own Account Production in the Micro size, while it is the reverse in the small category. Medium size has all the three models equally weighted while large ones do not have any contract manufacturing at all, and the latter is reasonable to expect.

Tables 5.10 and 5.11 reports 'Average gross value added' and 'Gross value added as percentage of gross value of output' by different types of establishments in the financial year 2006/2007

Table 5.10: Average gross value added by different types of establishments, 2006/2007

Firm size classes	Gross value added per establishment, (Tk. 000s)			
	Own-account producers	Contract manufacturers	Others, Mixed	All (average)
Micro	3153.43	190.75	790.63	2349.34
Small	8588.85	20213.25	15550.87	10343.82
Medium	6203.54	8830.00	6375.00	6390.06
Large	26697.73	0.00	33740.00	27284.58
Mi-Small	7488.83	13539.08	11333.66	8543.26
Me-Large	15596.71	8830.00	20057.50	15676.51
All firms	9252.64	12866.36	12092.26	9938.90

Source: SMEF Survey, 2008

Table 5.11: Gross value added as percentage of gross value of output, 2006/2007

Firm size classes	Gross value added relative to Value of gross output, per establishment, across three types of establishments			
	Own-account producers	Contract manufacturers	Others	All
Micro	40.91	53.65	29.79	38.82
Small	38.27	46.00	59.77	36.79
Medium	30.07	39.20	25.86	29.61
Large	31.59	0.0	39.72	34.61
Mi-Small	38.48	46.03	58.59	37.25
Me-Large	31.25	39.20	36.60	31.83
All firms	35.28	45.26	53.92	36.19

Source: SMEF Survey, 2008

8.2.5 The Accuracy of Results from the surveys conducted for six sector studies

The objective of this subsection is to demonstrate, if only in passing, how a knowledge base can enhance the exercise of policy-making. We first show some important results relating to micro, small, medium and large establishments are presented in the following tables (5.12 and 5.13) based on data generated by two large-scale sample surveys of the SME sector carried out in Bangladesh during the last six years or so. The first source is the World Bank's Investment Climate Survey 2002. The second source is the in-depth surveys associated with six sectors, commissioned by the SME Foundation in 2006/7[107], which is the basis of the present report. Results from the two surveys are presented having the same format, in the interest of ready comparability. We then include some diagnostic results from a stochastic frontier production function for highlighting how certain behavioural variables, measured at firm level, can explain firms' distance from estimated efficiency or production frontiers (Table 5.14). We include these results because we also wish to be able to do similar econometrically appropriate diagnostic analyses with the data that this implementation would enable one to generate.

[107] The sector team leaders of the second study are Naeem Chowdhury, Momtaz Uddin Ahmed, K. Siddique-e-Rabbani, M. Kamal Uddin, Saleh Ahmed and M. Burhan Uddin. The overall team was led by Naeem Chowdhury, the team leader of the present implementation.

Table 5.12: Economic characteristics of micro, small, medium and large firms, 2002

(Unless otherwise indicated, financial values are in Tk. 000s)

Particulars	Micro	Small	MiSmall	Medium	Large
Sample size	34	195	229	127	621
Total sales	22177	28012.2	27145	75000.2	289013
Direct material cost	13033	18631.5	17800	51393.7	152994
Value added	9144	9380.6	9345	23606.4	136019
value added to total sales, %	41.23	33.49	34.43	31.48	47.06
No. of workers	5.47	28.27	24.89	68.4	415.2
Labour productivity	1671.6	331.8	375.45	345.12	327.6
Capital employed	11879.8	25078	23118.6	120930	250283
Capital-output (val added) ratio	1.29	2.67	2.47	5.122	1.84

Note: Sample size of the source is 977 establishments interviewed by Bangladesh Enterprise Institute (BEI) in 2002.

Source: Investment Climate Survey (ICS) data, 2002

Table 5.13: Results from the six sector studies surveys under the present survey commissioned by the SME Foundation in 2006/2007

(All numbers, unless said to the contrary, are measured in Tk. 000s)

Particulars	Micro	Small	Mi-Small	Medium	Large
Sample size	83	378	461	212	103
Total sales	6014.9	27250.7	23427.3	69975.6	338294
Direct material cost	2497.5	15606.1	13245.9	39794.8	163218
Value added	2445.9	8476.6	7390.9	29054.6	168406
value added to total sales, %	40.66	31.11	31.55	41.52	49.78
No. of workers	6.3	23.6	20.5	47.3	329.5
Labour productivity	388.24	359.18	360.53	614.26	511.10
Capital employed	2331.7	9777.8	8437.2	70140.4	135092
Capital-output (val added) ratio	0.95	1.15	1.14	2.41	0.80

Note: These are results compiled from six reports recently prepared for the SME Foundation. The International Economic Statistician / Team Leader of the present Maxwell Stamp Limited team was also the Team Leader of the said SME Foundation survey. Between the six sectors, 846 manufacturing establishments were surveyed and interviewed in considerable depth. The sectors are (a) agro & food processing; (b) designer goods industry; (c) electrical and electronics; (d) leather & footwear; (e) light engineering and (f) plastics. The averages are all weighted averages.

Source: SMEF Survey, 2008

Several similarities and dissimilarities between the two sets of results are notable, as follows: (1) Value added as a percentage of sales for the Mi-Small class of establishments is 31.5% in the present survey while for the ICS-2002, it was 34.4% while for the large enterprises, value added relative to sales in the said reports are, respectively, 49.8% and 47.1%. The percentages yielded by the two surveys are strikingly similar. The point is that both survey samples seem to have been drawn from the same universe.

(2) Labor productivity or value added per worker is one of the most central empirical metrics of an industry. In the present survey it varies between about Tk.359 thousand to about Tk.614 thousand, medium and large enterprises having higher values. On the other hand, ICS 2002 finds all these values clustered closely to around Tk.350 thousand (Tk.327 thousand to Tk.375 thousand) except for micro category, for which an extreme high value of Tk.1672 thousand has been found. In view of all economic and technological considerations this appears to be impractical, and one would tend to discard this particular data of ICS 2002. The higher output found in the present survey for medium and large enterprises seems logical, since increased use of automated machines and tools in these industries are expected to increase labour productivity. On this argument, the slightly opposite trend observed between small and large industries in ICS 2002 seem to place less reliance on the data acquired in that survey.

(3) Both surveys show that the Mi-Small and large establishments register significantly higher capital productivity, by returning lower or much lower capital-output ratios (capital productivity is inversely proportional to capital-output ratio) on an average compared with medium firms. This may be due to the fact that transition from a small to medium enterprise needs a lot of outlay of space, machinery and other facilities, but the marketing does not build up in the same proportion to compensate for the expenses. Besides, the management does not usually have the experience of going into a larger capacity, therefore medium industries have shown lower capital productivity. Again this figure is too low (capital-output ratio too high) for ICS 2002 data, and places the question of reliability again.

Table 5.14 shows the differences in gross value added between own-account production versus contract manufacturing in 2007, estimated over all industries in Bangladesh.

Table 5.14: Differences in gross value added between own-account production versus contract manufacturing in 2007, estimated* over all industries in Bangladesh

Firm size classes	Gross value added per unit (Tk. 000s)				Number of enterprises in Bangla-desh	Grossed up value of gross output (Tk. million)	Grossed up value of value added (Tk. million)
	Own-account product-ion	Contract manufac-ture	Others	All			
Micro	3153	191	791	2349	590	1210	1386
Small	8589	20213	15551	10344	216	5483	2234
Medium	6204	8830	6375	6390	28	665	179
Large	26698	0	33740	27285	25	2293	682
Mi-Small	7489	13539	11334	8543	806	---	---
Me-Large	15597	8830	20058	15677	53	---	---
All firms	9253	12866	12092	9939	859	9651	4481

*Estimated based on the growth rate of small industries between 2002 and 2007

Source: SMEF Survey, 2008

In Table 5.14 the total number of enterprises in Bangladesh under each category were estimated based on the growth rate of small, medium and large enterprises as obtained by economic census 2001/2003 and Bangladesh Bureau of Statistics (BBS) data from BR2007. However, when applied to the micro category this resulted in a figure which is much higher than expected. On close examination it was revealed that the BBS Data included many enterprises having one, two or three employees, while the data analysed in the present survey were for an average employment of 6.3 per firm. Looking into the BBS data it may be guessed that about 30% of the firms should correspond to our category. Therefore the number of micro enterprises have been assumed at 30% of the value obtained using the previous method.

8.2.6 Production technique

To highlight production techniques employed, inputs were obtained with regards to machinery and tools used and Table 5.15 shows the variety of tools used in the electricals & electronics sector of the industry. It also shows the average number of machines of various kinds that are employed in Bangladesh.

Table 5.15 Number of machines/equipment per establishment

Firm size classes	Average number of machines per establishment																
	Drill	Ball press	Power press	Hydra-ulic press	Compre ssor	Wind-Ing mach.	Bend Ing mach.	Shear Ing mach	Twis ter	Mixer Mach.	Moul Ding Mach.	Lathe	Cutt Ing Mach.	Extru der	Cable maker	Mould	Others	Oscillo-scope
Micro	3.89	4.5	1.5	1	1	1.25	0	2	0	1	0	1	1	0	1.4	0	4.8	1
Small	3.97	4.38	3.63	2.33	1.33	3.91	1.33	1.92	1.78	1.80	5	4	2.44	1.5	1.5	6.67	3.23	2
Medium	4	5.67	5.8	1.5	1.5	4	0	1	2	4	0	8.14	0	3	2	3	4.5	2
Large	6.5	6.25	10.12	3.17	2	5.33	0	3.33	0	0	5	19.43	2	0	1	0	4	2
MiSmall	3.95	4.4	3.43	2.14	1.29	3.2	1.33	1.93	1.78	1.73	5	3.65	2.35	1.5	1.45	6.67	3.44	1.86
MeLarge	5.43	6	8.46	2.33	1.75	4.67	0	2.27	2	4	5	13.79	2	3	1.5	3	4.2	2
All	4.17	4.91	5.35	2.26	1.45	3.62	1.33	2.08	1.8	1.92	5	8.23	2.32	1.5	1.46	5.75	3.54	1.89

Note: The numbers in the foregoing table are based only on the number of ‘core’ machines, both those bought new or in used condition. The number of auxiliary tools and devices has not been included in this calculation.

Source: SMEF Survey, 2008

Table 5.16 presents the unit values of these categories of machines. Before proceeding any further, it is necessary to appraise oneself about how these replacement costs were evaluated. During the survey, we assessed the value of capital equipment in three ways, namely, ‘replacement’ cost, ‘resale value’ and (historical) acquisition cost. The question asked of the respondent while evaluating the replacement cost was: “What would it cost today were this piece of equipment, as it is, were to be purchased today?” The question is quite straight-forward where new equipment are concerned. But what about used machines? Now, experienced entrepreneurs or chief technologists typically have an idea about what a given piece of equipment would likely cost in today’s prices. Unless the industry manufacturing that particular piece of equipment were characterized by a high rate of technological obsolescence, such ideas would likely also be fairly accurate. Our Survey Research Analysts (SRAs) were typically able to develop a warm rapport with our respondents. People largely cooperated. Thus, we were able to generate a fairly accurate characterization of the fixed investment in plant and machinery (not counting value of land, building and structures) by these establishments. It would be recalled that the SME Policies Strategies 2005 stipulates that establishments with up to Tk. 15 million worth of plant, machinery and equipment (not counting value of land, building and structures) should be treated as ‘small’. And establishments with between Tk. 15 million and Tk. 100 million worth of plant, machinery and equipment (not counting value of land, building and structures) should be treated as ‘medium’. Now that we have this data relating to replacement cost on hand, we shall now be able to classify sample observations according as whether they are ‘micro or small’ or ‘medium’, from the perspective of SME Policy Strategies 2005.

Table 5.16: Average price of different machines used in different category of industry

(in thousand taka)

Firm size classes	Drill	Ball press	Power press	Hydra-ulic press	Compre ssor	Wind-Ing mach.	Bend Ing mach.	Shear Ing mach	Twis ter	Mixer Mach.	Moul Ding Mach.	Lathe	Cutt Ing Mach.	Extru der	Cable maker	Mould	Oscill-oscope
Micro	11.7	115	350	0	0	10	0	100	0	70	0	70	0	400	800	0	35
Small	14.2	17.7	143.92	240.83	51.66	41.5	65	226.2	106.87	71.25	11.2	116.53	45.5	600	553.33	340.33	92.5
Medium	10	205	236.66	207.5	25	0	0	1540	200	70	0	129	0	1500	800	0	0
Large	15.2	8.5	374	171	92.5	250	0	415	0	0	0	77	21	0	8000	0	0
MiSmall	13.67	33.91	169.68	240.83	51.66	31	65	214.72	106.87	71.11	11.2	110.33	45.5	577.77	676.66	340.33	73.33
MeLarge	10	139.5	322.5	185.6	70	250	0	836.87	200	70	0	103	21	1500	4400	0	0
All	13.49	55.03	220.62	206.31	57.77	62.28	65	476.68	117.22	71	11.2	107.4	42	670	1607.5	340.33	73.33

Note: All numbers in the foregoing table are based on replacement costs of the equipment

Source: SMEF Survey, 2008

Foregoing two tables enable us to estimate total replacement cost of all plant and core machinery in use in the industry. This is presented in Table 5.17.

Table 5.17: Total value of machines used in an enterprise

(in thousand taka)

Firm size classes	Drill	Ball press	Power press	Hydra-ulic press	Compre ssor	Wind-Ing mach	Ben-ding mach Ing mach.	Shear Ing mach	Twis ter	Mixer Mach	Moul Ding Mach	Lathe	Cutt Ing Mach	Extru der	Cable maker	Mould	Oscill-oscope	Total
Micro	45.5	517.5	525	0.0	0.0	12.5	0.0	200.0	0.0	70.0	0.0	70.0	0.0	0.0	1120.0	0.0	35.0	2596
Small	56.3	77.5	522.4	561.1	68.7	162.3	86.5	434.3	190.2	128.3	56.0	466.1	111.0	900.0	830.0	2270.0	185.0	7106
Medium	40.0	1162.4	1372.6	311.3	37.5	0.0	0.0	1540.0	400.0	280.0	0.0	1050.1	0.0	4500.0	1600.0	0.0	0.0	12294
Large	98.8	53.1	3784.9	542.1	185.0	1332.5	0.0	1382.0	0.0	0.0	0.0	1496.1	42.0	0.0	8000.0	0.0	0.0	16916
Mi-Small	54.0	149.2	582.0	515.4	66.6	99.2	86.5	414.4	190.2	123.0	56.0	402.7	106.9	866.7	981.2	2270.0	136.4	---
Me-Large	54.3	837.0	2728.4	432.4	122.5	1167.5	0.0	1899.7	400.0	280.0	0.0	1420.4	42.0	4500.0	6600.0	0.0	0.0	---
All	56.3	270.2	1180.3	466.3	83.8	225.5	86.5	991.5	211.0	136.3	56.0	883.9	97.4	1005.0	2347.0	1957.0	138.6	10192

Source: SMEF Survey, 2008

The last column of Table 5.17 gives an idea of the total value of machinery used by the different categories of industries, as defined in this survey, based on the number of employees. If we now compare with the definition of the Government (SME policy 2005), all industries except the present ‘large’ ones fall under SME policy’s ‘Small’ category, and the present ‘large’ ones would fall under SME policy’s ‘Medium’ category, and that on the lower side. In fact if we consider a large industry that enjoys economy of scale, then none of the industries in the electricals and electronics sector in Bangladesh fall under the true ‘large’ category, except perhaps Eastern Cables, owned and run by the Government. Therefore the definition based on machinery is not inappropriate if the electricals and electronics sector is considered. However, this may not correspond well to other industrial sectors. This also suggests that if definition is based on the number of employees, then a ‘large’ enterprise should be defined with much more than 100 employees. In fact in the SME Task force report 2004, a recommendation was put forward to exempt all small industries having machinery investment under Tk 3 million of all taxes and VAT. This agrees well with the total obtained here for the micro category having a corresponding average of about Tk.2.6 million. Unfortunately the Government approved all the recommendations of the SME Taskforce except this one, and the whole effort to promote the case of SME’s have been effectively thwarted by this single disapproval.

Table 5.18 presents the percentage of establishments that primarily use one or the other kind of machines, and this gives a picture of the type of machineries used. Looking at the high value of cable maker machine, it can be inferred that many of the enterprises surveyed produced electrical cables, of which there is a large country-wide demand.

Table 5.18: Percentage of establishments that primarily use one or the other kind of machines

Firm size classes	Drill	Ball press	Power press	Hydra-ulic press	Compressor	Wind-Ing mach.	Ben-ding mach. Ing mach.	Shear Ing mach	Twister	Mixer Mach.	Moul Ding Mach.	Lathe	Cutt Ing Mach.	Extruder	Cable maker	Mould	Oscilloscope	Total
Micro	1.75	19.93	20.22	0	0	0.48	0	7.70	0	2.69	0	2.69	0	0	43.15	0	1.34	100
Small	0.79	1.09	7.35	7.89	0.96	2.28	1.21	6.11	2.67	1.80	0.78	6.55	1.56	12.66	11.68	31.94	2.60	100
Medium	0.32	9.45	11.16	2.53	0.30	0	0	12.52	3.25	2.27	0	8.54	0	36.60	13.01	0	0	100
Large	0.58	0.31	22.37	3.20	1.09	7.87	0	8.16	0	0	0	8.84	0.24	0	47.29	0	0	100
Mi-Small	0.76	2.10	8.19	7.25	0.93	1.39	1.21	5.83	2.67	1.73	0.78	5.67	1.50	12.20	13.81	31.97	1.92	100
Me-Large	0.26	4.08	13.31	2.11	0.59	5.69	0	9.27	1.95	1.36	0	6.93	0.20	21.96	32.22	0	0	100
All	0.55	2.65	11.58	4.57	0.82	2.21	0.84	9.72	2.07	1.33	0.54	8.67	0.95	9.86	23.02	19.19	1.35	100

Source: SMEF Survey, 2008

Table 5.19: Utilization and valuation of land resources used on the sample

Farm status	Particulars regarding land						
	% of cases owning land on which business done	% of cases renting land on which business done	% doing both	land use per firm (decimal)	amount lease/ Month	Amount given at once (in 000 tk)	Value of own land in 2007 per firm (Tk. Lac)
Micro	8	92	0	5.1	12261	752.99	26.25
Small	29	62	9	23.6	15104	1943.33	119.97
Medium	33	47	20	30.5	23960	2061.11	94.51
Large	16	42	42	40.7	32666.6	3000	120.79
Mi-small	24	69	7	31.9	14308.2	1616.95	114.45
Me-large	25	45	30	34.7	28084.2	2530.55	106.01
All	24	65	11	24.1	17092.7	1822.51	111.75

Source: SMEF Survey, 2008

Table 5.19 indicates the value of land resources used. If we compare the above with the capital needed for machinery by the different category, it becomes evident that owning land requires almost double that required for machinery, which is the reason most of the micro industry opt for rented premises. However, as it grows owning land becomes a better option. Surprisingly, less proportion of large industries seem to have dependence on own land, compared to the small and medium ones, value of own land for each large enterprise being almost the same as that for small ones. This could be explained based on the culture and attitude of the people. When they grow from micro to small, the first instinct is to pull saved money into buying properties, as it is a secure investment. However, the large units have more business acumen, and they make a judicious cost effective scheme, which may be the reason for less dependence on own land.

8.2.7 Capital-labour ratio, labour and machine productivity

Proportions in which labour and capital are utilized in production by the establishments constitute an important dimension of a narrative concerning the technology platform in any real-life industry. Bangladesh is a labour-surplus but capital-deficient economy. The use of capital, particularly of that devoted to machinery, relative to labour is therefore is an indicator the prudent use of capital and labour in an effort to create value-added in manufacturing. Motivated thus, we have estimated capital-labour ratio for the sample defined as:

Capital labour ratio = (fixed capital excluding land and buildings) / (labour number)

By fixed capital, we meant machinery, plus the value of other support capital stock (such as vehicles, generators, furniture and fixtures, and the like).

We also analysed three other productivity issues, defined as follows:

Labour productivity = (Output quantity) / (labour number)

Machine Productivity (quantity) = (Output quantity) / (Machine quantity)

Machine Productivity (value) = (Output quantity) / (Machine value)

Table 5.20 shows the above productivity factors as obtained from our survey.

Table 5.20: Capital labour ratio, labour and machine productivity

Enterprise Status	Capital-labour ratio (Tk)	Labour productivity	Machine (quantity) productivity	Machine (value) productivity
Micro	38.58	1635	7177	0.17
Small	27.99	1076	4631	0.38
Medium	30.37	457	2612	0.051
Large	22.31	587	3790.5	1.67
Mi-small	23.81	1202	5205.1	0.33
Me-large	22.98	515.4	3135.7	1.06
All firms	28.93	1067.7	4800	0.47

Source: SMEF Survey, 2008

In the above table the capital labour ratio appears to contradict intuitive trend that larger enterprises should have higher capitals, and therefore higher capital-labour ratio. As can be seen later (Table 5.28) larger enterprises enjoy a bigger share of trade credit which reduces their capital requirement, and this may explain the apparently reverse trend.

Average Physical Product (APP) and Marginal Physical Product (MPP)
Marginal Physical Productivity

Having discussed the technology platform in some detail, we now move on to characterizing technologies in terms of their underlying production-function characteristics. To do so, we shall need to fit production functions to the data. To do so satisfactorily requires some comparative discussion of the specifications of different production functions and what they mean in terms of important attributes of such production functions. Table 5.21 shows the Productivities and relevant elasticities.

Table 5.21: shows the Productivities and relevant elasticities

Farm status	Marginal product of labour	Marginal product of machine	Labour Elasticity	Machine Elasticity
Micro	6298.6	-412.2	4.65	-.18
Small	897.6	514.7	1.18	.21
Medium	1457.2	-364.6	2.9	-.12
Large	242.4	1456.9	.46	.49
Mi small	858.4	658.6	1	.27
Melarge	362.3	1442.4	.7	.49
All	389.9	1559.8	.59	.58

Source: SMEF Survey, 2008

8.2.9 Cobb-Douglas Production Function

No discussion of physical productivities can proceed very far before invoking tried and tested concepts of production function, such as Cobb-Douglas (CD) or Trans-log (TL) production functions. These production function provide a representation of the production technology that underlie the actual situation of a given sample of firms. To a discussion of these two classes of production as established by our data that we now turn.

CD has been the functional form of a production function of the longest standing in the applied economic literature. This well-known function is represented by the formulation:

$$Q = AL^{\alpha}K^{(\alpha-1)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Where Q represent the level of output;
A represents, in an abstract sense, the state of the technology;
L represents the amount of labour used by the technology;
K represents the amount of capital used by the technology.

With a suitable logarithmic transformation of the equation (1), we get

$$Ln(Q) = LnA + \alpha LnL + (\alpha\text{-}1)LnK \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

All inputs are preferably to be measured in physical units. Thus Q will be measured using physical units (eg metres or pieces), L will be measured using person-years and capital in capital-years.

Alternative production functions include the Cobb-Douglas and CES (Constant Elasticity of Substitution) production functions. The Cobb-Douglas production function is given by:

$$\ln Q_{j,t} = \beta_0 + \sum_i \beta_i \ln X_{j,i,t} - u_{j,t} + v_{j,t}$$

With a CD production function, the returns-to-scale is unity, and the elasticity of substitution between labour and capital is also equal to unity. There have been a large number of studies using Bangladeshi data of whether the Cobb-Douglas formulation remains a relevant representation of the underlying technological relationship between input and output in several industries. Thus for instance, Ahmed (1992) has researched the returns to scale in manufacturing in Bangladesh using the CD formulation. As well, Chowdhury and Ahmed (1999) have estimated returns to scale in several industries using the CD formulation.

A more flexible form of production function that is worth considering here is the Trans-log Production Function. The most frequently used being a translog function, which is a second order (all cross-terms included) log-linear form. This is a relatively flexible functional form, as it does not impose assumptions about constant elasticities of production nor elasticities of substitution between inputs. It thus allows the data to indicate the actual curvature of the function, rather than imposing a priori assumptions. In general terms, this can be expressed as:

$$\ln Q_{j,t} = \beta_0 + \sum_i \beta_i \ln X_{j,i,t} + \frac{1}{2}\sum_i \sum_k \beta_{i,k} \ln X_{j,i,t} \ln X_{j,k,t} - u_{j,t} + v_{j,t} \quad \ldots(5)$$

where $Q_{j,t}$ is the output of the establishment j in period t and $X_{j,i,t}$ and $X_{j,k,t}$ are the variable and fixed establishment inputs (i,k) to the production process. As noted above, the error term is separated into two components, where $v_{j,t}$ is the stochastic error term and $u_{j,t}$ is an estimate of technical inefficiency.

8.2.10 Empirical Implementation of the Production Function

Of both the CD and TL production functions, we implement two versions each. The first of these is a traditional CD functional form, in which output is said to be a function of just labour and capital. Labour in this case is about all kinds of labour, including the white collar workers too in the mix. Capital is about fixed capital, about which we have had occasion to say quite a few things already. The alternative functional form throws into the melting pot a third variable, namely, the sumtotal of material inputs. Such inputs include raw materials of all kinds that have been used in production. We estimate each of the production functions in one of three alternative versions, the chief differentiator among these three is whether we measure the 'output' in physical or value terms. Where output is in physical terms, the dependent variable is measured in units of the homogeneous-output already talked about. In that case, labour and inputs are also measured in physical terms---labour in person-years, and input in units of homogeneous-inputs.[108] Fixed capital is always measured in monetary terms. When it comes to estimating the production function in TL forms, having three explanatory variables mean that there are in all nine variables on the right hand side of the production function form (not counting the constant term). The following table presents the estimates of the coefficients of both forms of the production function. Table 23 shows the coefficients of production functions (of various kinds) in the year 2006/2007:

Table 5.22: Coefficients of production functions (of various kinds), 2006/2007

Explanatory variable	Cobb-Douglas: version 1		Cobb-Douglas: version 2		Trans-log: version 1		Trans-log: version 2	
	Coeff.	T-stat	Coeff.	T-stat	Coeff.	T-stat	Coeff	T-stat
Constant	4.7*	13.52	4.7	12.3	2.2	1.7	2.7	1.99
Ln(labour)	0.530	4.66	0.554	5.34	2.44	5.1	2.548	4.8
Ln(capital)	0.483	7	0.450	7.1	0.107	.35	-.028	-.091
Ln(input)			0.038	1.37			-.049	-.376
Ln(labour)^2					0.041	.20	.070	.375
Ln(input)^2							.008	3.4
Ln(capital)^2					0.151	3.5	.139	.687
Ln(labour)*ln(capital)					-.255	-3.4	-.243	-3.487
Ln(labour)*ln(input0							-.033	-.826
Ln(capital0*ln(input)							.019	.849
R^2	0.562		0.602		0.602		0.641	
F-ratio	84.813		65.966		39.856		25.37	

Source: SMEF Survey, 2008

Estimates of the regression coefficients from a CD functional form are also estimates of the elasticity of the function with respect to those arguments of the function. Output has an elasticity of 0.53 with respect to labour, and of 0.48 with respect to capital. The F-ratio---which is a summary measure of how well-specified the functional form under review is for the data on hand for the most parsimonious form of the CD function is the highest, at 84.8. After we throw 'input' into the mix of independent variables, the F-statistics, although still large, fell noticeably.

[108] Once again, we use price relatives, this time for inputs, in order to 'chain' comparator inputs into units of 'benchmark' input.

According to the Cobb-Douglas specification, the returns to scale is constant. Both coefficients are highly significant and intuitively signed. The TL function too is fairly well-behaved, with most of the coefficients being intuitively signed and statistically significant. The TL set of results suggest that the returns to scale are slightly increasing.

TL functional forms add slightly to the r-squared, but subtract from the F-ratio. We seem to have a trade-off to make.

We also test for whether returns to scale are constant in this industry. The steps adopted leading up to the test are as follows:

For this industry, we find that the null hypothesis that returns to scale in it are constant can not be rejected. Increasing returns to scale are not proven.

8.2.11 Determinants of labour productivity

We next turn to the determinants of labour productivity across firms. The explanatory variables on which we regress estimates of labour productivity include the following:

(xviii) Average product price;
(xix) Fixed capital per worker;
(xx) Bank credit per worker;
(xxi) Percentage of output exported;
(xxii) Percentage of imported materials, parts and components in firm input-mix;
(xxiii) Length of formal schooling on the part of the Managing Director
(xxiv) Length of any specialized training attained by the Managing Director;
(xxv) Three firm size dummy variables;
(xxvi) Two location dummy variables, to correspond to location in Dhaka and Chittagong;
(xxvii) Age of the firm.

Table 5.23 shows the determinants of labour productivity in 2006/2007

Table 5.23: Determinants of labour productivity in 2006/2007

	Labor productivity (output)		Labor productivity (gva)		Labor productivity (revenue)	
	Beta	t statistic	Beta	t statistic	Beta	t statistic
Const	10.673	13.504*	-.757	-.600	3.524	5.089*
age of unit						
MD's education			.214	1.538		
ave. workers experience	.168	.937	.269	.984	.155	.875
White collor workers experience						
cluster						
Bank loan dummy	-.243	-1.330	-.299	-1.007	-.239	-1.314
automated or manual dummy (manual=0)			-.325	-1.259		
Fixed capital per h.c.	.397	6.735*	.413	4.424*	.390	6.742*
% of output exported						
Input_import	.003	1.809**	.007	2.607*	.003	1.815**
own account dummy						
firm size dummy 1			.648	1.173		
firm size dummy 2	.172	.961	.737	1.685**	.170	.951
firm size dummy 3	-.289	-1.040	.354	.663	-.313	-1.138
average product price	-.849	-8.060*	.456	3.495*	.191	2.278*
District Dhaka						
District Chittagong	-.778	-3.392*	-.751	-2.129	-.766	-3.359*
R Square		.477		.328		.386

Source: SMEF Survey, 2008

It is typical in traditions of applied production research literature to estimate coefficients of production functions using a single-equation estimator. Many example of such a use of such a procedure can be found in the literature relating to manufacturing industries of Bangladesh. It needs to be pointed out categorically that the use of such a procedure leaves something to be desired. It has been well-established for sometime now that in specifications such as this one, the disturbance term is correlated with measured labour input or measured capital input. Because only the quantity of the measured labour or capital input enter the equation (1) or (2), the worker quality can only appear to be a part of the disturbance term. The quality or the relevance of experience, or the educational qualification of workers will frequently depend upon the spatial distribution of the supply of opportunities of educational or training upgrading. The supply of educational or training facilities, mostly a preserve of public or voluntary-sector activities, is treated as part of the disturbance term in equation (1) and (2). And yet it is incontrovertible that this supply is not without some effect on the quality or competency or relevance of the skills of workers, which are bound to affect the average or marginal productivity of workers in the study industry. The presence of correlation between the explanatory variable and the disturbance term in equation (1) thus is a tell-tale presence of a simultaneity bias in equation (1). This needs mitigation.

On another level, it is quite likely for the measured capital input to also be correlated with the disturbance term. Why? The selection of a best-practice stock of machines is desirable for everyone, but it takes a special skill, it takes experience, and it takes specialized knowledge. To the extent there is an active market to trade such skill or knowledge, such market is unlikely to have a national footprint but is quite likely to be concentrated in the capital city or the lone port city, squeezing the locations outside the capital or the port city. To put it differently, the spatial distribution of such markets of critical importance, which affects the productivity of capital machinery, will typically be treated as part of the disturbance term. The presence of correlation between the explanatory variable and the disturbance term in equation (1) thus is a tell-tale presence of a simultaneity bias in equation (1). This again needs mitigation.

More formally, in order to obtain a quantitative measure of the contribution of factors to firms' production, we need production function parameter estimates that are consistent. A firm with high total productivity---typically lumped with the disturbance term in the econometric estimation---will hire more labour and other variable inputs. This correlation between the productivity part of the residual (seen by the firm's manager, but not by the econometrician), and the observed values of the variable results in biased parameter estimates.

We shall therefore need to implement a two-stage procedure to purge the implementation of equation (1) and (2) of the presence of simultaneity bias: in short, we shall implement an instrumental variable approach. The instruments that we shall use are as follows:

(a) The number of public-sector colleges and universities within the jurisdiction of the districts whence our sample has come;
(b) The number of public and private training institutes within the jurisdiction of the districts whence our sample has come;
(c) The number of firms selling specialized professional services (providers of technical assistance) of one kind or the other within the jurisdiction of the districts whence our sample has come;
(d) The number of branches of banks and leasing companies within the jurisdiction of the districts whence our sample has come;
(e) The number of licenced micro finance institutions (MFIs) within the jurisdiction of the districts whence our sample has come;
(f) The number of business enterprises within the jurisdiction of the districts whence our sample has come.

Using these instruments, we conducted our Two-stage Least-Squares (2SLS) estimation of both the production functions. However, the results obtained were much degraded compared with those obtained by ordinary least-squares estimates. These results are therefore not presented here to prevent result clutter. We shall therefore have to do with estimates obtained from ordinary least-squares regressions of the production functions.

8.2.12 Estimating returns to scale

Some production functions are linearly homogeneous of degree one. A production function is linearly homogeneous of degree one when doubling the quantity of each input in the production function also doubles the output that can be obtained from it. Alternatively put, the returns to scale on a linearly homogeneous production function of degree one are also unitary. In such a case, returns to scale are also said to be constant. It is of some importance to be testing the foregoing two estimated production functions for the constancy of the returns to scale. It is now to this that we turn.

8.2.13 Estimating total factor productivity (TFP)

Total Factor Productivity (TFP) is defined as the part of the output that results from what is over and above the quantities of inputs that can be measured. There are two main sources of growth, whether in an enterprise or the economy as a whole. One of these parts is called factor accumulation. Factors in this context correspond to labour, capital, raw materials, and the like. A certain, in fact a major, proportion of the product is owing to factor accumulation. However, there is a second component in output that can not be ascribed to the factor accumulation, but is instead a residual. This is the part of the output that is ascribable to other than factor accumulation. Nobel Laureate Robert Solow called this as due to technical progress.

TFP is calculated using a two-stage procedure that is an instrumental variable approach. The way in which it works is that in the first stage, the explanatory variables are regressed on a fairly large number of instrumental variables. The predicted values of the explanatory variables will be featured in the second stage of the exercise. The explanatory variables in the second stage will include not just measured fixed and variable inputs but also a whole group of relevant (shifter) variables that might conceivably influence the values of the endogenous variables. The residuals obtained at the second stage will be averaged over the sample to yield a average measure of total factor productivity---this is a measure of technical progress prevailing in the sector of interest. This value will lie between 0 and 1: the higher close to unity is the value of this TFP, the better is the state of TFP prevailing in the industry or sector in question.

Provisioning of assets---access to physical capital (such as plant and machinery, etc.), human capital (education, skills, technological cognitive abilities, etc.), financial capitall (debt, retained earnings, etc), social capital (brand power)--- and productivity are major factors behind productive self-employment. Variations in quantity and quality of provisioning of public goods --- spatial access and location, density of banking infrastructure, agglomeration benefits arising due to "clustering effects", the density of market channels, information and skills-building infrastructure, etc. --- usually are an important source of spatial variations. Many of these variables have putative effects on marginal factor productivities achieved by firms. And yet they tend to be lumped merely as part of the disturbance terms in most econometric exercises. These public goods translate into significant heteorogeneities among sample firms in total factor productivities (TFP)—an important growth source. These will be brought into the scope of the analytical work that we hope to do as instrumental variables.

8.2.14 Productivity gap between clusters within the industry, and the industry itself

The production functions point up a summary picture which holds true for the sample in question as a whole. This same is true when it comes to estimates of the total factor productivity function---another set of summary results. These results appeal well when one is interested in sample-wide insights. If, as is quite likely, one is interested in intra-sample insights and results, estimates of production function strike one as if 'one is dressed well with no place to go'. One is in this uncomfortable position whenever, as now, diagnostic results and diagnostic insights are warranted. Here, one is interested in getting estimates of inter-firm 'scores' or 'ratings' even as one uses data on firms' output and inputs in an effort to see how the two stack up.

It is here that we, like many researchers before us, invoke the stochastic frontier function (SFF), which was first independently by both a Dutch team of econometricians, and also by Aigner, Lovell and Schmidt (1977). Subsequently, important work in this tradition was done by Kumbhakar (1982). The specification of the SFF is as follows.

The formulation is such that it is practicable to calculate the productivity deficit of each sample observation from the 'stochastic frontier' for the industry in question. This is how we plan to calculate the productivity gap of each of the clusters relative to the frontier production function estimated for that industry.

8.2.15 Estimation of Stochastic Production Function

Using stochastic production frontiers in differentiating the firms on any given sample in terms of a well-accepted metric of firm performance is an oft-used method in applied industrial research. We, too, would be using such a method. We reproduce below work in which distance of sample of observations from an estimated stochastic frontier is regressed upon quite a number of explanatory variables in order to generate a diagnostic analysis of some value. Table 5.24 presents estimates of the coefficients of the stochastic frontier production function, using MLEs

Table 5.24: Estimates of the coefficients of the stochastic frontier production function, using MLEs

Frontier estimate				
Coefficients	**least square estimate**	**t-value**	**Half normal estimate**	**z-value**
constant	4.7	13.52	4.83	3.03
β_L	.530	4.66	.530	4.72
β_K	.483	7	.483	7.11
σ_v	1.008		.989	
σ_u			.071	
σ			.992	
λ			.071	

Source: SMEF Survey, 2008

8.2.16 The Drivers of Estimated Technical Inefficiency

Following the lead of the analytical model developed in Annex-II and using estimates from Table 5.24 of the standard errors of the two components of the error term---one distributed as a normal variate and the other distributed as a truncated, half-normal variable, we estimate the 'distance' of the value added registered by each sample observation (which is a kind of measure of efficiency) from an estimated stochastic production frontier. We then regressed this distance on a number of behavioural or strategic choice variables, such as opting for (or obtaining a) bank loan, fixed capital provisioning per workers, average product price, etc. The explanatory variables on which distance from the frontier is regressed include the following:

EDUC= Number of years of schooling of the Managing Director's formal schooling (natural log of years);

PER_EXP = % of the firm's output that is exported;

CHT_DUM = A dummy variable that takes the value of unity for Chittagong and zero everywhere else;

DHK_DUM = A dummy variable that takes the value of unity for Dhaka and zero everywhere else;

AV_P_PR = Average product price (natural log of Taka);

B_LOAN = Bank loan;

AGE = Number of years since the establishment of the firm;

The following table presents the results obtained from the regression analysis:

(1) Having a bank loan reduces distance from the production frontier. This suggests that bank loans induce greater efficiency in this industry compared with firms that are more internally financed;

(2) Enhancing the formal education length of the Managing Director is found to have a positive effect on the efficiency of the firm;

(3) Average product price fosters greater inefficiency, presumably by breeding complacency.

The point of presenting these results is that one can harness relatively advanced methods and still demonstrate results with diagnostic values in formulating policy stances. Certainly, in this implementation, we would be spending a lot of time trying out various models of policy diagnostics on the data that we shall generate for the SMEF and the MOI. Table 5.25 presents the determinants of the distance from the estimated stochastic production frontier.

Table 5.25: Determinants of the distance from the estimated stochastic production frontier

Model	Unstandardized Coefficients		t -stat
	B	Std. Error	
(Constant)	.232	.793	.293*
Import	-.004	.002	-1.891*
D/mic	1.375	.403	3.411*
D/small	.550	.335	1.642
D/Med.	.623	.407	1.531
Ln Fixcap	-.422	.067	-6.261*
Dhaka	-.824	.251	-3.278*
Ln APP	-.162	.095	-1.709*
Ln B. loan	.009	.027	.343*
R square		.408	

Note: One asterisk shown in the column labeled 't-stat' shows the variable is significant at 5% error probability level; two shows significance at 10% error probability level

Source: SMEF Survey, 2008

8.2.17 Access to finance

Before we could present an analysis of the access to finance on the part of SMEs, we need a framework of discussion as to what we shall mean by access to finance regime? The regime typically involves the following narrative variables, namely, (1) size structure of loans; (2) structure of interest rates[109]. We recognize two categories of loan, namely, i) institutional & non-institutional loan, and ii) trade credit[110]. The issue remains that the coverage of the data relating to institutional and non-institutional loans is better compared with trade credit. That is why we also present weighted average using two alternative bases. One of these bases only takes into account institutional and non-institutional loans. Trade credit is missing from the other. We present information concerning loan sizes with respect to three borrower situations, namely, institutional loans; non-institutional loans and trade-credit.

i) Structure of loan sizes

Table 5.26 presents results concerning several indicator variables cited above, namely, the proportion of establishments with access to institutional loans, average loan size and average interest rates. For each category of loans types, we also present information about interest rate structures. However, we need to discuss this issue in view of Table 5.5 before, which mentions that the total amount of debt constitutes not more than 10 to 12 % of the total capital requirement for any industry, large or small, in the electricals and electronics sector in Bangladesh.

Table 5.26: Structure of institutional loans taken by establishments in 2006/07

(Tk. 000s)

Farm status	No. of bank loan taker	% of cases with bank loan	Average loan size per firm, that received bank loans	Average loan size taking all firms	No. of leasing company loans	% of interest for bank loan
Micro	2	8	295	23.6	0	14
Small	21	24.42	6452.39	1575.58	0	15.2
Medium	3	20	11666.67	2333.33	0	14.33
Large	5	41.67	35200	14666.6	0	14.2
Mi small	23	20.73	5916.95	1226.03	0	15.1
Melarge	8	29.62	26375	7814.81	0	14.1
All	31	22.47	11196.45	2515.14	0	14.93

Source: SMEF Survey, 2008

Within the sample studied, the micro enterprises fare the worst in terms of taking bank loans, and it is reasonable to expect under the practical circumstances in

[109] One could also argue that (1) structure of outstanding loans with respect to the value of fixed collaterals; (2) the age-structure of arrearages ought also to be included in the definition of finance regime. We agree completely. We made an effort to also collect data on outstanding loan values and their age structure. It is in the area of access to finance that the degree of cooperation of our respondents with the survey was the most lackadaisical, if not outright adversarial. In a very large proportion of cases, the respondents simply refused to discuss the issue of 'outstanding loans' and 'age'

[110] Trade credit is also recognized in our data. For three of our sectors, respondents cooperated more than in others as far as interest rates on trade credits. For the sectors where the data were the most inclusive, trade credit averaged roughly at 33.3% annually. It is this average that we have used for the other three sectors where data was not available.

Bangladesh. The interest on bank loans are about the same for all categories, 14 to 15%, even the 'large' ones are not large enough to have a negotiating power with the banks.

Table 5.27 presents the structure of non-institutional loans taken in 2006/07

Table 5.27: Structure of non-institutional loans by establishments, 2006/07(Tk. 000s)

Firm size	No. of non-Institutional loans taken	% of cases with loans	Average loan size of firms that received loans	Average loan size taking all firms	% of interest for bank loan
Micro	3	12	300	36	16
Small	2	2.32	3100	72.09	6
Medium	0	0	0	0	0
Large	0	0	0	0	0
Mi small	5	4.5	1420	63.96	12
Melarge	0	0	0	0	0
All	5	3.62	1420	51.44	12

Source: SMEF Survey, 2008

It can be seen that small enterprises are the major beneficiary of non-institutional loans trailing significantly by the micro category, while medium and large do not bother to go for such loans at all. As mentioned before, the pattern is logical. One does not have enough confidence on a starter micro enterprise to risk one's savings, while the confidence increases in case of small. For medium and large enterprises, they have enough ability to obtain bank loans, and more importantly to obtain trade credits. Therefore they do not feel the necessity of going for non-institutional loans. Again, drawing less confidence, the micro has to pay a high interest rate, more than that of a bank, while the small enterprises can negotiate well to obtain loans at a very small interest rate as shown.

Table 5.28 shows the structure of trade credit availed by establishments in 2006/07

Table 5.28: Structure of trade credit availed by establishments, 2006/07

Firm size	No. of trade credit taker	% of cases with trade credit	Average loan size of firms that received loans	Average loan size taking all firms	% of interest for trade credit
Micro	8	32	498.75	159.6	38.25
Small	45	52.32	1873.83	980.49	56.08
Medium	9	60	2152.22	1291.33	43.88
Large	7	58.33	13769.46	8032.18	14.42
Mi-Small	53	47.74	1666.27	795.6	53.39
Me-Large	16	59.25	7234.76	4287.26	31
All	69	50	2957.52	1478.76	48.2

Source: SMEF Survey, 2008

It can be seen that the higher the standing of a firm in the ladder, higher is its capacity to obtain trade credit, which is also natural to expect. However, the rate of interest in case of micro, small and medium enterprises is very high; several times higher than that charged by banks. Only large ones can have the same rate as given by the banks.

Table 5.29 presenting average equity-debt ratio in the electricals and electronics sector highlights the same information given earlier in Table 5.5 that total amount of debt is only a small fraction of the capital invested in all the categories.

Table 5.29 Average equity-debt ratio

Farm status	% of equity	% of debt	Equity-Debt ratio
Micro	96.46	3.54	27:1
Small	90.95	9.05	10:1
Medium	90.9	9.1	10:1
Large	95.47	4.53	21:1
Mi-small	92.19	7.8	12:1
Me-large	92.93	7.07	13:1
All	92.34	7.66	12:1

Source: SMEF Survey, 2008

ii) Assessing the state of the provisioning of working capital finance

In an article published in 1964, Professor Amartya Sen, now of Harvard University, formulated how one can get at the working capital needs of businesses. Working capital, he argued, comprises largely of five sub-components. They are (i) value of input inventories; (ii) value of work-in-progress; (iii) value of output inventories; (iv) average value of the receivables[111]; and (v) the amount of cash on hand, which generates the equivalent of 'convenience yield' of having the cash resources to prevent any situation that is akin to 'stock-outs' or 'cash-outs'. Being out of cash resources will be tantamount to doing without, and will thus be a potentially costly situation.

Needs for working capital finance closely correspond to the concept of capacity utilization. Accurate assessment of needs for any resources can only be gleaned from a prior assessment of the 'true economic' capacity, not from the 'rated engineering capacity'. Without minimizing the importance of the engineering rated capacity to industrial or production engineers, the fact remains that such engineering capacities need not closely correspond to what is, for cash-gain-maximizing firms, economically rational to produce. Before we can talk about the requirements for finance, we have to assess the economically relevant capacities of the establishments.

Respondents were asked about how many days in a year they typically want their businesses to stay open. When answering our question about the level of production achieved, we had also solicited from the respondents information about the utilization of their capacities. We have now a choice between two measures of economic capacity, namely, the output equivalent of the number of days of intended operation cited by the respondent; and the capacity directly cited by the respondents. In every case, we choose the lower of the two values. Table 5.30 presents the need or

[111] Receivables will no doubt correspond to different 'time-profiles'. There is instinctively a need for an 'averaging' in a situation like this. We derive this value while dividing the reported value of receivables by two: the average value of the receivable would naturally be an average of the 'longest' due and the 'youngest' due.

the requirement of access to finance in terms of working capital from the perspective of the entrepreneurs themselves.

Table 5.30: Working capital provisioning per establishment

(Taka 000s)

Firm size class	Raw material inventories	Finished-goods inventories	Transaction demand for cash resources(cash in hand)	Net Receivables in the market	Value of work in progress	Total working capital
Micro	1231.41	0.71	54.8	430	50.2	1767.12
Small	6462	0.91	393.1	1641.4	98.1	8595.51
Medium	5374	1.82	319.7	1679.7	967	8342.22
Large	18742.3	2.02	2285	16675	1104.5	38808.82
MiSmall	5283.9	0.86	316.9	1368.6	87.3	7057.56
MeLarge	11315.5	1.90	1193.1	8344.2	1025.2	21879.9
All firms	6464	1.07	488.3	2733.4	265.3	9952.07

Source: SMEF Survey, 2008

The trend is logical, more working capital is required by the medium and large sized industry. Regarding net receivables, large industries fare better because of their power to control the market.

We estimate working capital requirement based on firms' attainment of its capacity. Our questionnaire had solicited information about the percentage capacity utilization achieved. Before proceeding any further, it is worth asking if it at all makes sense that we might try to envisage a capacity for each of the products. Where firms are mono-product firms, evaluation of capacity is typically a straight-forward matter: one merely divides the rated economic capacity of the firm, evaluated in terms of the one product that it manufactures by the output, again measured similarly, and multiplied by a hundred.[112] Where, as is presently the case, multi-product firms predominate numerically, it is necessary to help respondents define the very concept of capacity so as to accommodate the plurality of the cash-gain-maximizing output-mix of firms. This has been done presently.

Table 5.31 presents the proportions of revenue generated by each of the sample observation's main products. We use these percentage (or relative shares) as weights in migrating from product-specific capacity utilization estimates into a weighted average capacity utilization estimate. This is presented in Table 5.32. It is these findings that we need to discuss more fully.

Table 5.32: Relative Weight of Various major products

% of Revenue from different products

Farm status	IPS	Cable	UPS	Fan	Others	Total
Micro	9.29	49.55	0.30	5.39	35.45	100
Small	8.98	25.89	1.55	9.47	54.08	100
Medium	9.20	28.50	1.48	9.32	51.48	100
Large	10.12	17.22	1.24	32.84	38.56	100
Mi small	13.99	4.08	3.17	48.08	30.65	100
Melarge	13.17	6.87	2.77	44.85	32.32	100
All	10.54	20.16	1.93	22.28	45.07	100

Source: SMEF Survey, 2008

The above table shows that cable form the largest product category among the micro enterprises while Fan constitutes the largest product of large enterprises. Cable dominates in the small and medium category as well.

Table 5.33: Weighted average capacity utilization

Farm class	Product One	Product Two	Product Three	Weighted average capacity utilization (%)
Micro	58.5	64.4	68	59
Small	61.9	60.7	55.8	61.1
Medium	66.7	52.5	53.3	60.3
Large	64.5	77	57.5	65.7
Mi small	61.2	61.4	58	60.9
Melarge	65.7	66.1	55	62.7
All	62	62	57.5	61.1

Source: SMEF Survey, 2008

From Table 5.33 it can be seen that the weighted average capacity utilization is not much different among the categories in this sector; it being slightly higher for the large category. This means that given adequate working capital, this sector could make a significant improvement.

8.2.18 Comprehensive understanding of the marketing chain

Marketing is the business of connecting consumers with manufacturers. This involves transporting a commodity between places, storing it between periods and changing its form to make it fit for human consumption. In all economies, this is a vital function to perform efficiently, i.e., at least possible resource costs. Economies, and markets, differ in terms of how well the marketing function is performed. Marketing is efficiently performed when the marketing agents charge keen rates for the use of their resources -- time, money, skills, vehicles or fixtures, assets, godowns and risk-bearing -- and earn competitive cash-gains. The consumer pays a price that is deemed closely related to the resource costs of supplying to him the commodity in the quantity and at the place and time desired. The manufacturer receives a price that keenly compensates him for the use of the resources up to that stage of production. Understanding how competitively a market performs involves looking at the costs of and normal returns to marketing. On the cost side, we look at the cost of production, and at the cost of spatial arbitrage and at the cost of marketing. Finally, we look at the wholesale and retail margins of benchmark versions of products produced by sample observations covered by us in the survey.

i) Cost of production

Table 5.34 presents the average cost of production in homogenized units. That is, if there is a product mix, these are homogenized into one representative product through an appropriate analysis of the cost, production time, etc.

Table5.34: Average cost of production of final produce

(Taka per homogenized unit)

Firm class	Cost of production per establishment (Tk. 000s)	Physical output, in homogeneous units (000s)	Cost of production per unit of output (Tk).
Micro	3809.5	11968	850
Small	15040	25756.7	660
Medium	17354	32023	540
Large	64436	85349.7	1090
MiSmall	12510.8	22651.2	700
MeLarge	38279.4	55724	770
All firms	17552.5	29121.9	720

Source: SMEF Survey, 2008

Before proceeding any further, we have to note that these average costs of production cover a relatively large collection of products. These averages in the table are weighted averages, arrived at by dividing average outlay per establishment across size classes by the corresponding average physical volume of production. Cost of production of a homogenized physical unit decreases for micro category upwards, which is reasonable to expect, but the large category surprisingly breaks the trend. Since this sector deals with technical products, it seems reasonable to expect that large industries have the market confidence to produce and make higher quality and higher value products. This becomes evident by looking at Table 5.35.

Table 5.35: Average price of different products

(Taka per unit)

Farm status	IPS	Cable	UPS	Fan
Micro	10613.64	458.5	5125	1250
Small	14236.84	843.8	10314.2	1280
Medium	10333.3	700	3700	1208.3
Large	25666.6	1500	7000	1392.8
Mi small	12908.3	731.45	9161.11	1275
Melarge	18000	900	5350	1307.6
All	13750	755.5	8468.1	1292

Source: SMEF Survey, 2008

ii) Reliance on own sales outlets versus distributors versus commissioned sales agents

The following subsection secures an explanation of the different degrees of marketing strategies of the sample observations based on comparing their reliance on each or all of the three alternative options cited in the foregoing. Table 5.36 shows the market channels employed by this sector.

Table 5.36: Market channels for domestic sales

Firm size class	% sold through wholesalers	% sold through own outlets	% sold through agents	% sold through others
Micro	30.2	10.4	4	43.3
Small	45.6	23.7	0	16.6
Medium	57.3	18	3	8
Large	50.4	16.2	0	16.6
MiSmall	42.2	20.7	.9	22.64
MeLarge	54.2	17.2	1.8	11.8
All firms	44.5	20	1	20.5

Source: SMEF Survey, 2008

It appears that the small, medium and large categories use wholesalers as their major market channel while it is not so for micro enterprises. These enterprises mostly supply their products direct to retailers which is under the heading of 'others'. Own outlets assume about one fifth of sales on average for all categories, again being less for micro, which find it difficult to afford own marketing outlets. Commission agents take a very small share of all the marketing channels.

Again, it seems justified to analyse the pattern of the wholesale channel individually, particularly to find out how it controls the credit situation and the cash flow of the manufacturing enterprise. Table 5.37 presents data relevant to this aspect.

Table 5.37: Wholesaling market channels

Farm status	Total wholesaler	% sold credit	Period of credit, days	% more charged for credit	% unpaid	Recent Unpaid (Tk, 000's)
Micro	16	65.7	31.2	5.6	17.2	4200
Small	29	58	36	2.2	13	3354
Medium	39	43	25.5	6.2	19	1733.3
Large	109	45	34.7	5	14	1017.5
Mi-small	28	59.5	35.5	2.8	14	3547.9
Me-large	67.1	44.2	29.2	5.9	16.9	1375.4
All	39.1	55.2	33.6	3.7	14	3113.4

Source: SMEF Survey, 2008

It can be seen that micro enterprises are at the most disadvantage, as they have to give the maximum credit, and a large fraction of it remains unpaid at any point in time. The small category is in a slightly better position, while medium and large enterprises have a still better position. The period of credit is the same, about a month in all the categories, and all establishments charges slightly more for supplying products on credit.

Table 5.38 shows the situation with own direct sales outlets of the manufacturing enterprises.

Table 5.38: Own direct sales outlets

Farm status	Total sales Outlet	Employees No.	Administrative cost	Wages	% Rejected	Loss for Rejection (Tk. 000's)
Micro	1.14	2.42	16.8	3416	.8	69.7
Small	1.2	4.1	28.64	3652	3.5	252.1
Medium	1.5	4.6	52.83	3333.3	1	40
Large	3.2	19.5	132.85	4416.6	2.9	383.3
Mi small	1.2	3.9	27.21	3626.7	3.1	224
Melarge	2.4	12.6	95.92	3875	2.3	246
All	1.4	5.5	39.79	3670	3	227.6

Source: SMEF Survey, 2008

Large enterprises have more sales outlets than the others, which is reasonable to expect. There is a few percent rejection from this marketing channel which has to be accounted for in the pricing of the products. This information is also important for the management.

Table 5.39 is about the economics of the commissioned agents and about the terms under which manufacturers' transactions take place with them. The first table gives an overall picture while the second one gives the credit transactions through this channel. The loss due to product rejection through this channel is also shown. However, one needs to remember that the contribution of commission agents remain as a small percentage of the total sales of this sector.

Table 5.39: Marketing through Commissioned agents

Farm status	Total Agent	Total wages	Per head Com, %	Total Com. (Tk)	% rejected	Loss for Rejection
Micro	1	6000	10	72000	2	5
Small	9	2667	20	234333	3	53
Medium	-	-	-	-	-	-
Large	-	-	-	-	-	-
Mi small	7.25	3500	18	193750	3.3	41.25
Melarge	-	-	-	-	-	-
All	7.25	3500	18	193750	3.3	41.25

Source: SMEF Survey, 2008

iii) Exports versus domestic marketing

The following table presents information concerning the comparative reliance of the sample establishments upon domestic sales versus exports. It can be seen that none of the enterprises export any product.

Table 5.40 Exports versus domestic marketing

Firm size class	% of revenue derived from		
	Sales domestically	Exports	Total
Micro	100	0	100
Small	100	0	100
Medium	100	0	100
Large	100	0	100
Mi-Small	100	0	100
Me-Large	100	0	100
All firms	100	0	100

Source: SMEF Survey, 2008

iv) Drivers of unit costs of production

Unit costs are defined as the total cost of production divided by the rate of the establishment's output. The following budget line items have been added up while getting at total cost of production:

- Cost of raw materials;
- Cost of other materials (such as fuel, lubricants, dyes and chemicals, packing materials)
- Spares parts, and cost of preparing moulds etc.
- Repair and maintenance, etc

- Financing costs
- Office supplies
- Communication, storage, and transportations
- Wages and salaries
- All kinds of utility expenses
- Advertisement expenses
- Marketing outlay
- Rentals of various kinds
- Commercial expenses arising in connection with foreign trade
- Miscellaneous expenses

Table 5.41 reports costs of production per establishment across the firm size classes.

Table 5.41: Cost of production per establishment (Tk.000's unless stated otherwise)

Firm size class	Raw materials costs	Parts & components, repair & maintenance	Wages	Other expenses	Total cost of production	Overall cost of production per unit of output (Tk)
Micro	3572.7	53.8	252	187.2	4065.7	3810
Small	14619.9	294.1	1080.7	1153.4	17148.1	15040
Medium	15521.9	223	2392.2	1963	20100.1	17354
Large	60049.6	690	5400	4625.6	70765.2	64436
Mi-Small	12131.8	240	888.9	838	14098.7	12511
Me-Large	35312	430	3729.1	3170.1	42641.2	38279
All firms	16667.1	277.2	1456.9	1295.5	19696.7	17553

Source: SMEF Survey, 2008

In the last column, the table reports on average cost of production. The average cost of production is clearly a rising function across the four size classes of the establishments in this industry. This is mostly because the larger establishments go for higher end products at higher unit values, as discussed before.

Table 5.42 gives a distribution of the expenses incurred by an average firm under each category. The advertisement cost needs special mentioning. It increases at a very high rate for larger categories. It indicates that micro enterprises limit their sales mostly within known people around, therefore do not spend much on advertisement. As a firm graduates and goes to the higher class, it needs to advertise publicly to be able to sell. Such entrepreneurs are not mentally prepared initially to go into advertising for which they do not see any immediate benefit. This poses a big challenge for entrepreneurs.

Table 5.42: Average Expense per firm (Tk. 000's)

Firm class	Raw materials	Maintenance	Interest	Utility	Wage	Advertisement	Rent	Commercial
Micro	3572.7	53.8	4.4	88.4	252	8.8	85.6	0
Small	14619.9	294.1	315.9	315.9	1080.7	83.1	197.3	241.2
Medium	15521.9	223	354.2	867.7	2392.2	241.7	452.8	46.6
Large	60049.6	690	959.1	1757.5	5400	467.5	391.5	1050
MiSmall	12131.8	240	147.8	264.7	888.9	66.4	172.2	186.9
MeLarge	35312	430	633.4	1263.2	3729.1	355.4	425.6	492.5
All firms	16667.1	277.2	244.2	460	1456.9	122.9	221.7	246.7

Source: SMEF Survey, 2008

Table 5.43 gives a contribution of different factors on the total cost of a product. It can be seen that raw materials take up almost 70 to 75 percent of the cost in all the categories. Wages constitute the next important factor. The low contribution of advertisement indicates that the manufacturing entrepreneurs in electricals and electronics sector in this country still rely on non-advertising marketing channels, from which we need to come out.

Table 5.43: Contribution of different factors on the cost of production

(percentage)

Firm class	Raw materials	Maintenance	Interest	Utility	Wage	Advertisement	Rent	Commercial
Micro	71.7	2..9	.25	4.3	14.8	.79	5	0
Small	77	2.9	1	3.3	12.3	.51	1.9	.71
Medium	68.7	1.4	2.4	7.2	14.8	1.1	3.8	.18
Large	78.4	1.7	1.5	2.7	12.1	.77	1.2	1.3
MiSmall	75.8	2.9	.87	3.5	12.9	.57	2.6	.55
MeLarge	73	1.6	2	5.2	13.6	1	2.6	.69
All firms	75.2	2.6	1.1	3.9	13	.65	2.6	.58

Source: SMEF Survey, 2008

8.2.19 Fitting Cost Functions

Competitive cost analysis is important for a number of reasons. While financial accountants concern themselves mainly with elements of costs --- and this concern is also importantly shared by the management --- it is however the cost drivers that are of far greater operational significance. The literature suggests that cost drivers essentially fall into four categories, and they are (i) design-related costs; (ii) facility-related costs; (iii) geography-related costs; and finally (iv) operation-related costs.

Before proceeding any further, it is moot to enter just a few sentences each with respect to each of these four categories of cost drivers.

Design-related cost drivers: Because a product owes itself to a design process, it is imperative to get the design-related costs of alternative specifications right. This is necessary so that an apples-to-apples comparison is possible among alternative product designs that offer comparable functionalities. It is important in doing to start off from an well-agreed definition of what is the goal of the design process. We mean to say that the same set of functionalities can be achieved with or without offering additional desirable capabilities. Such design-stage add-ons will always come on with cost additionally.

Facility-related cost drivers: Some production technologies are such that it is advantageous to scale their output up, because larger scales of output ensure economies of scale, which smaller scales of output don't. This consideration makes it imperative to treat the scale of output, or the technologically-determined size of the plant a facility-related cost driver that we need to model the effect of. As well, at times, the economies of scale are not so much technologically datum as the derivative of some economic incentives, for instance the fact that volume discounts may be available on input purchases, and that large scales of output are associated with large volumes of input purchases. That is, there are economies of procurement and marketing. If used or rented equipment are cost-effective relative to new equipment, the recycling of used or rented equipment is a desirable cost driver. If frequent power outages render investment on large capacity electricity generators cost-effective, the shrewdness in the process of locating the least-cost generation technology is likely a positive cost driver.

Geography-related cost drivers: Spatial pockets of relatively high wages, or high input prices exist in every country. Rental rates are relatively high in certain clusters than in others. The down-payments that need to be made in the swankiest parts of the city in order to lease 'showroom' or 'display centers' tend to be much higher than in boorish parts of town. The point is that geography can be destiny in certain kinds of businesses. And yet geography can be an important competitive cost motivator.

Operation-related cost drivers: It is increasingly recognized that manufacturing operations can be more or less mean. Japanese manufacturing has famously introduced lean manufacturing, or the just-in-time (JIT) manufacturing. The extent of specialized training of the Managing Director will be an operational cost driver, as will whether the establishment is located on or near the all-weather highway. As well, the ratio of the number of production workers to the number of mid-level supervisory and managerial workers will also shape up as yet another operational cost driver. Moreover, percentage reliance of the establishment on imported raw materials (to be evaluated using the ratio of imported parts and components in the total outlay on raw materials) will be utilized as yet another operational cost driver.

The really important question is what the drivers of the unit cost of production are. To answer that question, we shall need to consider a number of competitive cost drivers.

The most basic form of the cost function is the one in which the unit cost is simply modeled as a function of the rate of output. At times, in order to test for any non-linearity in the cost surface, a quadratic term is also typically factored in. Sometimes, even a cubic term is also introduced into such a cost equation. Under these circumstances, the cost function has the following appearance:

$$\text{Ln } C = c_0 + c_1 * \ln(Q) + c_2 * \ln^2 Q + c_3 \ln^3 (Q) + c_i \Sigma X_i$$

Where C = Average cost of production

Q = The rate of output

c_0, c_1, c_2 and c_3 are coefficients of the cost function to be estimated;

'ln' is the code of natural log;

and X is a matrix of a number of explanatory, shifter, variables.

Such a model can only be reasonably applied to the data provided it is certain that the output of the study establishments is homogeneously measured.

Table 5.44 presents the coefficients of the logarithmic cost function that we have estimated. The following findings are highlighted by the numbers. Firstly, we find that the underlying cost surface is like a whip-saw in the log-log space, in this industry. The coefficient of the log-linear segment is positive and highly significant. This means that as scale of output rises early on, unit cost declines significantly, as, for instance, machines are 'run in', workers run up the learning curve. As a result of both factors, raw material wastage tends to decline. The log-square term is negative and highly significant too. Over the relevant range of output, this happens because severe diseconomies of scale and scope set in, thus ratcheting unit costs up. The log-cubic term then is negative once again, with its coefficient highly significant. Dummies for micro, small and medium establishments are each highly significant. Because the large establishments provide the control in the specification of these three dummies, the implication is that relative to large establishments, unit costs of micro, small and medium establishments are, given their quality quotients, significantly lower.

Table 5.44: Determinants of logarithmic cost function

(Regressing natural log of average production cost per unit of output in Taka)

	Regression coefficient	t-stat
(Constant)	7.393	12.934*
LN_Q	6.878E-05	9.153*
LN_Q_2	-5.352E-10	-5.182*
LN_Q_3	1.279E-15	4.055*
CTG_DUM	.881	1.663**
DHK_DUM	1.102	2.200*
F_D_1	-1.449	-5.100*
F_D_2	-.474	-1.947**
F_D_3	-.247	-.849**
R^2		.765

Source: SMEF Survey, 2008

Note: Single asterisk attached to a t-statistic implies that the corresponding regression coefficient is significant at 5% error probability level, and two asterisks imply significance at 10% error probability level.

The rate of output drives unit cost; while it is certainly of some pedagogical interest, is not of much policy importance. This is so because the output itself is a composite, and a subject of the combined influence of many factors of production. It does not single out the role or the importance of any one particular driver that may be of some quantifiable importance to policy makers.

Much has been made in the literature of the fact that capacity utilization be used as a competitive cost driver. This does not however accord very well with econometric principles. Capacity utilization is simply a ratio between the rate of output achieved to some well-formed notion of economic capacity. One reason why this is not all that interesting from the perspective of policy formulation is because in a real sense, this is not all that dissimilar to the foregoing cost function: unit costs are merely functionally dependent upon not so much the measure of output as on a transformation of output. The latter is bound to closely correspond to the output itself. Therefore, this formulation is not interesting for the same reason that the first functional formulation is not interesting.

8.2.20 ICT Platform

Since introduction of Information and Communications Technology (ICT) into business makes a big difference for a growing and forward looking industry the state and the relevance of the infrastructure that is harnessed by the sample observations is of interest. Table 5.45 reports on the average number of personal computers, servers, mobile and fixed telephony connections etc. that the sample has returned per user.[113]

Table 5.45: Penetration of ICT

Farm status	% of establishments with						
	At least one personal computer	At least one server	At least one Internet connection	Band width	At least one mobile phone	At least one fixed telephone line	Business automation software
Micro	36	4	20		84	48	0
Small	48.8	1.1	34.8		89.5	82.5	3.4
Medium	73.3	13.3	60		93.3	100	13.3
Large	83.3	8.3	75		100	100	8.3
Mi-small	45.9	1.8	31.5		88.2	74.7	2.7
Me-large	77.7	11.1	66.6		96.2	100	11.1
All	52.1	3.6	38.4		89.8	79.7	4.3

Source: SMEF Survey, 2008

An average of 52% of establishments having at least one personal computer gives a good sign that entrepreneurs are forward looking. Many of them have internet connections too. The penetration is also higher for higher categories which is logical. In the case of mobile or land telephones the penetration is much higher, 80% to 90%, which shows the dependence on telephony. However the firms are yet to take up business automation software with earnestness, the usage is very small, in only a fraction of the establishments.

8.2.21 Management structure

Taxonomically, 'flat' versus 'hierarchical' management structures are really the two polar divides that come to mind. The two terms are not necessarily unambiguously defined in the literature. Lay people would understand by flat management structure a rather loose, informal, fluid structure in which canons regarding relationships between tasks and briefs, chain of command and accountability, even rewards and rebukes, are not formalized. Such informality is frequently the mantle of micro and small, at times even medium-sized, enterprises. Hierarchical management structures however set much larger store by codification and formalization, and documentation processes. Such processes are often written into business rules that get codified into the working of human resources, software that get written so as to enforce such hierarchy in as much an impersonal manner as possible.

Respondents were asked to assess if their own management structures were flat in some 'general' manner. Their responses have been tabulated in Table 5.46 below. It

[113] These are averages. These averages are calculated based only on respondents that own any or all of the ICT devices cited in the previous discussion. Cases returning zeroes, while perfectly valid for other computations, have been omitted from the calculations surrounding Table 5.45.

can be seen from the table that the management is totally flat in the micro category and predominantly flat in the small. Medium and large enterprises have more of the hierarchical structure as one would normally expect, however, the difference between medium and large enterprises is somewhat unexpected. It may be that many of the large enterprises are still run by old family ownerships, having conservative attitudes, and they have not adopted changes that make a successful corporate model. On the other hand medium enterprises are set up by young and dynamic entrepreneurs and they quickly adopt to better management options.

Table 5.46: Profiles of the management structure

	Units having a flat Mgmt structure		Units having a hierarchical Mgmt structure		All	
	No	% of total	No.	% of total	No.	% of total
Micro	25	100	0	0	25	100
Small	65	75.6	21	24.4	86	100
Medium	4	26.7	11	73.3	15	100
Large	5	41.7	7	58.3	12	100
MiSmall	90	18.1	21	81.9	111	100
MeLarge	9	33.3	18	66.7	27	100
All	99	71.7	39	28.3	138	100

Source: SMEF Survey, 2008

8.2.22 Growth

Before we take growth strategy up, we have to remind ourselves that growth will need to be pro-poor. In a pro-poor scheme of things, we need to grasp, with some real accuracy, the process whereby the 'demand' for labour and capital drive themselves at the levels of the firms that comprise the world of manufacturing. After all, it is these drivers of factor demand in general, and of labour in particular that any growth strategy will need ultimately to be about. We therefore have invoked a full-information model so as to estimate a system of 'input demand functions'. The factors or inputs considered are labour, fixed capital and material inputs. In order to estimate this system of equations, we employ Zellner's Seemingly Unrelated Regression Estimators (SURE). This estimator is the most appropriate when the disturbance term are correlated across the equations comprising a system of equation of the kind to be introduced in the appendix to this report. It is quite appropriate to say that it is in the determination of the labour demand and capital demand that we are most interested. Table 5.47 gives the relevant coefficients obtained through the analysis.

Table 5.47: Annual growth rate over firm's life

	Beta coefficient	t statistics
(Constant)	.549	4.023
D/mic	-.203	-3.210
D/small	-.078	-1.451
D/Med.	-.070	-1.053
Ln Age	-.187	-10.071
Ln APP	.015	.920
B.loan dummy	.045	1.221
R square		.486

Source: SMEF Survey, 2008

A very simple analysis for growth was also attempted. It was expressed as

$$(n2 - n1) / (n2 * y)$$

where n2 is the present number of employees, n1 is the number at start-up of the industry, and y is the age of the industry since start-up. The findings are given in Table 5.48. It was assumed that the growth in the number of employees can be an indicator of the growth of the enterprise. On this basis, it can be seen that the highest growth, of about 13% occurred for large enterprises, while micro firms saw the least growth of about 3.4%, with the small and medium falling in between. Of course one has to remember that at start-up any industry usually have much less number of employees than it can utilize. Therefore, utilizing data of an intermediate time would be necessary to have a better estimate based on this analsis.

Table 5.48: Simple growth

Firm Size	(n2 - n1) / (n2 * y)
Micro	0.034
Small	0.06
Medium	0.08
Large	0.13
Mismall	0.059
Melarge	0.102
All	0.067

Source: SMEF Survey, 2008

Table 5.49 gives the Return to investment obtained in the electricals and electronics sector. It can be seen that the highest return to investment occurs for the large category, at about 33% of net cash-gain, while it is about 16% for the micro category, small and medium falling in between. The trend is reasonable to expect.

Table 5.49: Return to investment

Firm size Class	% of gross cash-gain return to investment	% of net cash-gain return to investment
Micro	17.9	16.4
Small	24.8	22.6
Medium	28.9	25.2
Large	35.4	33.1
Mismall	23.3	21.2
Melarge	31.8	28.7
All	24.9	22.7

Source: SMEF Survey, 2008

8.2.23 R&D activity and expenses

In order to assess in-house R&D capability and activity information collected is presented in Table 5.50.

Table 5.50: R&D Activity and expenses

Firm class	% of farm having R&D	No. of employee for R&D	Annual expenditure on R&D	% of revenue involved in R&D
Micro	40	1	66645.2	2.9
Small	41.8	1.4	187000	5
Medium	66.6	2.8	214500	2
Large	50	2.5	458585.4	1.6
Mi-Small	41.4	1.3	158219.5	4.6
Me-Large	59.2	2.6	315005.7	1.8
All	44	1.6	200526.9	3.9

Source: SMEF Survey, 2008

It can be seen that a good proportion of firms (average 44%) has R&D activity and they spend about 4% of their annual revenue in R&D. R&D is necessary to maintain the technological capability and competitiveness in the market.

8.2.24 Capability of maintaining quality of products

In order to assess the internal capability to produce items of quality a question was set out to get information on in-house technically qualified personnel and the results are presented in Table 5.51.

Table 5.51: Quality Control (QC) personnel information

	No. of Employee	Experience, years	Wage (Tk.)
Micro	1	6.7	4214.2
Small	1.7	11.7	5278.2
Medium	3.2	10	6549.8
Large	2.4	10.3	11954.5
Mi-Small	1.6	10.9	5137.7
Me-Large	2.8	10.1	9134.7
All	2	10.7	6347.3

Source: SMEF Survey, 2008

It can be seen that on average two people per firm having average experience of about 11 years look after Quality Control (QC) aspects of products. This is satisfactory for micro, small and medium enterprises, but the large enterprises should have more QC personnel.

8.2.25 Provision of On-job training to employees

On-Job Training (OJT) is an important necessity for maintaining and improving quality of production. Table 5.52 provides this information.

Table 5.52: On Job Training

Farm class	No of firms providing OJT	% of firm providing OJT	Duration of OJT		
			Skilled	Semi skilled	Unskilled
Micro	6	24			8
Small	23	26.7		8.3	9.6
Medium	6	40		7	14.5
Large	5	41.6	5	5	8.8

Farm class	No of firms providing OJT	% of firm providing OJT	Duration of OJT		
			Skilled	Semi skilled	Unskilled
MiSmall	29	26.1		8.3	9
MeLarge	11	40.7	5	6.3	11.9
All firms	40	28.9	5	7.3	10

Source: SMEF Survey, 2008

It can be seen that almost 40% of Me-Large and 25% of Mi-Small enterprises provide OJT. However, it should be appreciated that most micro and small enterprises train their workers rather informally which has not been incorporated here.

8.2.26 Obstacles

The survey also included a question to find out the obstacles from Government agencies for compliance with various requirements that the management faced in running the enterprise. Tables 5.53 and 5.54 present the responses received, the first table giving the figures in number of firms quoting a particular obstacle, while the second table presenting the same figure as a percentage of firms under each class.

Table 5.53: Management obstacles due to Govt agencies

(No. of farms)

Firm size class	VAT	Inco-me tax	Trade Lice-nse	TIN	Environment	BSTI	Boiler	CIFE	Govt. purchase	Others
Micro	18	13	10	7	3	9	-	-	-	-
Small	66	56	47	35	23	43	5	3	6	2
Medium	8	8	5	3	4	7	1	1	1	-
Large	10	9	8	5	5	6	1	1	4	-
MiSmall	84	69	57	42	26	52	5	3	6	2
MeLarge	18	17	13	8	9	13	2	2	5	-
All firms	102	86	70	50	35	65	7	5	11	2

Source: SMEF Survey, 2008

Table 5.54: Management obstacles due to Govt agencies

(% of farms)

Firm size class	VAT	Income tax	Trade License	TIN	Environment	BSTI	Boiler	CIFE	Govt. purchase	Others
Micro	72	52	40	28	12	36	-	-	-	-
Small	76.7	65.1	54.7	40.7	26.7	50	5.8	3.5	7	2.3
Medium	53.3	53.3	33.3	20	26.7	46.7	6.7	6.7	6.7	-
Large	83.3	75	66.7	41.7	41.7	50	8.3	8.3	33.3	-
MiSmall	75.7	62.2	51.4	37.8	23.4	46.8	4.5	2.7	5.4	1.8
MeLarge	66.7	63	48.1	29.6	33.3	48.1	7.4	7.4	18.5	-
All firms	73.9	62.3	50.7	36.2	25.4	47.1	5.1	3.6	8	1.8

Source: SMEF Survey, 2008

It can be seen that majority of all enterprises rate VAT requirements as the major problem (on average, ~74% of all firms). This is followed by Income tax, Trade License, BSTI, TIN and Environment requirements. Boiler inspection and problems in Government purchase has also been mentioned.

8.2.30 Technology improvement, access to technology, constraints

Most of the manufacturing MSME in the electrical and electronics sector thrives on technological innovation, however small that innovation may be. It could be an innovation of a product, or of a small part of it, or of the process, or of packaging, or of adapting a product for a targeted market, etc. This is unlike a large industry which goes for economy of scale in a proven technology for a proven product having a proven large demand and market. Unfortunately most of our policymakers have large industries in mind when they make policies for MSME.

For an MSME, the technology of production is very much dependent on the type of product, and the level of production where one starts and the level where one finishes. Here comes the importance of the technological capability and judgment of the entrepreneur him/herself, whether acquired formally or informally. The entrepreneur of a MSME usually finds a niche based on the existing technological infrastructure and facilities in the country, potential market demand of a product, cost effectiveness and profitability based on existing tax structures on the raw materials and that on the finished products, competitiveness with imported alternatives and with other local manufacturers, his/her own capabilities, availability of trained manpower or of manpower that may be trained up on-job, existing marketing chain, etc. The success of the enterprise depends very much on the overall assessment of the entrepreneur on all these aspects.

Therefore the technical knowledge and capability of the entrepreneur is of immense importance in an MSME. Requirement for technology enhancement comes automatically when an enterprise settles down in business and can have a breathing space, and obviously when there is a healthy competition. When an enhancement in the technology of the enterprise becomes a requirement of the day, the entrepreneur seeks it out from whatever resources available within the country, or from abroad. However, this needs a stable and consistent Government fiscal policy that does not change often. Suppose, based on previous success with a product and finding a large local market an entrepreneur invests a lot of effort and money in enhancing its technological level and quality. As soon as the enterprise gets ready for its commercial production if it finds that the import duty on that particular finished product has been reduced suddenly to a level that its local production is no more profitable, one can imagine what the consequences can be. That brings a downfall to the whole enterprise. This has happened in reality in the case of many products in the last decades, particularly those that are produced by MSME. The entrepreneurs of MSME cannot reach and influence the Government policymakers easily, while the rich traders and importers have much easier access and can exert more influence; therefore such happening is not uncommon in our country. This has happened particularly to a great extent in the electrical and electronics sector which has damaged this sector to a great extent. If the entrepreneur has adequate financial backing and tenacity s/he moves to another area for which existing tax structures allow adequate profitability, but in most cases the entrepreneur moves away from production altogether. The average age of about 10 years with most of the enterprises in this sector found in the present survey gives weight to this suggestion and analysis. This indicates that enterprises that were set up earlier, and which could have the experience and expertise to go for technological enhancement have all closed down. New entrants have tried to fill up the vacuum, they will again close down when they are ready for technology enhancement in future, if the current trend in policymaking continues.

Therefore one has to go deep to comprehend the shortcomings in technology that one sees with the MSME in this country. Most of the policymakers see it from the surface. They think that the infrastructure will be there automatically like that exists today in the developed West, and that any person with money can buy the technology and start an enterprise This is a wrong notion, and has to be appreciated well before making national policies. Thus the shortcomings in technology in the MSME sector that we frequently talk about do not stem from the non-availability of technology, or due the incapability of the entrepreneurs, but due to faulty Government fiscal and other policies that do not allow an existing MSME to grow further and to have a healthy competition.

Keeping the above analysis aside, if one looks at te current situation of technology of the MSME in the electrical and electronics sector one would find that there is a general lack of knowledge, expertise and equipment for quality control (QC). One reason is that QC equipment are usually foreign made and are too expensive for MSME's, particularly of the smaller units. It is also interesting to note that expertise to produce many such measuring apparatus and QC equipment exists within the country, but nobody asked these to be made. Therefore, one should think why the demand is not there for such equipment, and the analysis given above regarding profitability and sustainability of local MSME should be considered seriously. Therefore one has to appreciate the real situation and be sympathetic to the entrepreneurs when we talk about technological deficiencies of the local MSME.

A short list could be made to indicate where technological improvements are needed.

Electrical Subsector

This sector is mostly run by entrepreneurs with low or mid-level education. Therefore most of the manufacture is done through copying and adapting a foreign product. Without the necessary knowledge they lack the finer points that are needed to produce world class products.

a. Electrical cables. There should be QC of raw materials (copper and insulating material) at input and QC of the finished product at output. Detection and measurements of impurity in copper is very important. The electrical resistance of the finished wire and its insulation properties need to be measured too.

b. Fans: There ought to be apparatus to measure the amount of air flow and the electrical current and power consumed by the product. There should be R&D in getting the right shapes of fan blades to provide the maximum output. In Bangladesh table fans with plastic body are not made since it needs expensive moulds (dies) to make the plastic body. There is also scope for incorporating various aesthetic designs.

c. Transformers and arc welding machines: There should be incorporation of knowledge to increase the efficiency of these devices. QC apparatus needed to measure efficiency, leakage, inductance and reactance of the fabricated devices.

d. Switchgear and substation equipment, distribution boards: Apparatus to measure contact resistances are necessary, and there should be apparatus for the measurement of various properties like springiness and hardness, etc. of metallic parts used.

e. Plastic molding machine (manual types): Apart from improvement in the material and the mechanical aspects, these machines can be improved with the incorporation of electronic temperature controllers and timers.

f. Switch, sockets and accessories: The metallic parts used in most local accessories do not have the necessary springiness and hardness. This goes back to the manufacturers of the brass sheets who do not have the necessary facilities and temperature controlled furnaces for producing consistent qualities. Therefore, some attention needs to be given to these source industries. In the electrical industries, they need to have QC equipment for measuring the input raw materials, for measuring the hardness and springiness of the brass sheets. They need QC equipment for measuring the contact resistances as well. Of course sometimes just to compete, people intentionally produce lesser quality items. This can only be removed by having branded items so that the customers automatically can reject the low quality products. However, producers are scared to go for branding as then the harassment from corrupt customs officers increase many times.

g Light fittings: With improvement in glass and plastic manufacturing in the country the outer finishing of light fittings has improved significantly in the recent times. However, the sockets, as sourced from local suppliers and discussed in the previous item, still remain a weak point.

Electronic subsector

The enterprises dealing with assembly of foreign made kits (of television, etc.) do not have any scope to change or improve the qualities except in the assembling process itself. Of course the assembling quality of the local technicians is quite high if they are run by the right kind of management.

For the enterprises dealing with locally engineered products, this sector has the advantage that many of the entrepreneurs are innovative and have come with a mid-level or high-level educational background. It is interesting to note that some entrepreneurs do not have a formal education in electronics or technology as such, but through sheer interest developed later, they have learnt many of the technicalities well. Since the designing is done locally, they can change or adapt the models and technologies to make products with good functional quality. However, the main setback is in making a cabinet (housing) with good quality finishing for which the necessary infrastructure and facilities are lacking in the country. Most foreign electronic products have plastic cabinets with various fancy finishing, which makes them attractive to customers. Bangladesh Industrial Technical Assistance Centre (BITAC) was set up with facilities to produce high quality molds for plastic cabinets, but poor management (as it was a Government institution) and high cost charged eventually made this facility useless to the entrepreneurs. On the other hand, with much less facilities and less sophisticated tools, the private sector is trying to produce plastic molds with better quality. Unfortunately they have not yet reached the level needed for cabinets of electronic products.

The main impediment here is the volume of products that can be sold of a particular model. Good quality plastic molds can be made abroad and used to manufacture the cabinets locally through injection molding process, however, the cost abroad is very high, and the high import duty on such molds make them prohibitive.

As mentioned before, this sub-sector has been able to engage technically innovative people who can improve the quality if they try, but unfortunately, faulty tax policies which allow import and selling of most electronic finished products at low tax while levying many times higher taxes on the import of their raw materials and spares, an unfortunate situation created by corrupt Government officials, do not allow these innovative entrepreneurs to sustain their business and to improve the quality.

Infrastructure to improve quality of products

There is a general trend is asking the Government to set up expensive infrastructures to facilitate quality of industrial products. SMEF may also find similar requests coming from various quarters. However, one should realize that this path never worked before. We have set up BCSIR, BITAC, BMTF at earlier times which are still draining a large amount of our national resources (BMTF has recently been given over to the defense to produce items of their choice), but have contributed very little to the industrial development of the country. Duplicating a similar model by SMEF will eventually meet the same fate. Again in the eighties several high end Printed Circuit Board (PCB) fabrication facilities were set up by some rich industrialists in the country on the suggestion that a lot of outsourcing job will be available from electronic industries in the developed West, but it did not materialize and all the expenditure went down the drain. It is always prudent to go by the demand and the market forces, which only the private sector can follow, not the Government. Most of the electronic industries producing locally engineered products have their own in-house R&D. Therefore rather than spending on expensive infrastructures and central facilities, the Government should waive taxes on industries producing locally engineered products, since they spend their own resources for R&D. Again, if the faulty import tax policies are rectified, such activities will flourish and specialized R&D centres and enterprise incubators may come up which may be supported by SMEF or by the Government.

8.3 Case studies

8.3.1 A pioneering effort in Electronics in deathbed

Sporadic efforts started in the seventies to develop voltage stabilizers indigenously by several enthusiasts, mostly by copying circuits from neighbouring countries and to sell them locally. In the eighties some favourable Government policies were taken to support electronics and this prompted a graduate engineer at building a sizeable industry around 1985. This firm targeted the home market and by promoting a Brand name. Possibly the entrepreneur obtained the circuit design from neighbouring countries but designed and made his own transformers and cabinets. This brand identification helped his group to grow and became highly successful within a short time. His company developed a whole range of products starting from stabilisers for domestic fridges to large 3 phase industrial stabilisers. They also developed UPS, IPS, and other products and sold these successfully. Through customer feedback and continuous R&D their qualities have improved continuously and the company opened up show rooms at many places, also had distributors all over the country. At a certain phase the company had about 600 workers to support the market demand.

Due to faulty taxation policies taken in the late nineties and continued till today in spite of repeated requests as detailed later, this pioneering industry has shrunk to a mere fraction of what it was at times of boom.

However, engineers working in this establishment came out and initiated new industries learning the techniques and trades. They carry on well as long they are small and remain invisible to the customs officers, so that they can dodge VAT to make some cash-gain. However, as soon as they grow a little and become visible to customs officers, their profitability reduces compelling them either to close down, or to switch to importing and trading side by side with their manufacturing business. In fact most of these entrepreneurs are having their business survive through almost 80% importing and trading, and only 20% manufacturing, a bad omen for the nation.

8.3.2 A pioneering effort in Electricals remain stagnant

With the spread of electricity, demand for electrical accessories like switches. Sockets, etc. grew in the country since independence. In the mid eighties a pioneering entrepreneur visited factories in India to see how it is done. Just by looking at the machines he understood the mechanics, came back to Bangladesh and reproduced those machines locally. Using these machines he started manufacturing these accessories. Learning the trade by working in his factory, dozens of similar industries followed. Again workers from these came out to initiate more making the number of firms to a few hundred within a span of two decades. One of the close associates of the pioneer continues his industry till this day. His product has a good reputation of quality, and sells at a higher price than many others. Being a senior in this trade he enjoys considerable honour and respect from fellow entrepreneurs and wholesalers who distribute his products. However on a visit to his industry in 2003 and again recently the author found that the size of his industry on electrical accessories has remained stagnant, with almost the same number of employees. On query it was found that he somehow manages to keep his production within a certain limit so that he can utilize the ceiling fixed for a cottage industry (total yearly turnover of Tk.20 lakh, detailed later in this document) enabling him to pay 4% tax on total turnover. If he expands, he will have to come within the VAT regime of 15% which will render his industry unprofitable besides inviting a great deal of harassment from customs officers.

8.3.3 Why small industries grow and die out

This was a question posed to the author by an economist while working for the SME Taskforce in 2004. Through contacts with entrepreneurs the author seemed to find the answer, which has already been hinted above. Technically innovative people have a natural urge to make things that can help enhance the quality of life of surrounding people. This naturally grows to a micro industry. As long as this innovative enterprise is small enough to remain invisible to the customs officials, the enterprise gets a good cash-gain. Encouraged, other people in the neighbourhood also initiate similar enterprises. Thus a growth is observed which gets the support of the people and the media. However, this exposure brings their doom. Customs officers get to their doors charging the entrepreneur with the crime of not paying Government taxes and VAT. The officer also knows that complying with the existing VAT and tax rules will not allow the enterprise to make a cash-gain. So eventually the officer comes up with a solution that compels the entrepreneur to make a false account allowing the enterprise to pay a a very small sum as taxes to the Government, in lieu of a hefty bribe to the officer. If the entrepreneur does not comply with this proposal, the officer threatens with charges for past tax dodging. Thus starts a process of dodging and harassment, and the entrepreneur can never come out of this entanglement. Occasionally a new officer will demand greater amounts, and if refused, the officer will threaten the entrepreneur with court cases, calling the entrepreneur as a criminal. Such behaviour ultimately frustrates the entrepreneur and eventually leads to closure of the enterprise.

This description agrees with the finding of this survey, that the average age of the enterprises of all categories is about 10 to 13 years. In Bangladesh many small industries in electricals and electronics sector were established in the eighties and nineties. Where are they now? Normal dispersion around the above average cannot answer this question. Therefore, the description of the above scenario has to be taken seriously if we are to promote small industries in Bangladesh.

8.4 Overall recommendations for stimulating growth in the sector

8.4.1 Introduction: nurturing the 'baby plant'and deregulation

We have to remember that micro and small enterprises are like baby plants growing up. We have to 'water' this plant, provide necessary 'nourishment' and protect them from the onslaught of destructive elements. We should not expect anything in return at this stage. When the plant will grow to become a strong tree it will not need any further assistance to survive, but will provide a lot of services in return. On the other hand if we want services from the baby plant right from its inception, break off its leaves and branches, it will simply die and will not be able to give the great services that it has the potential of rendering.

Among the whole spectrum of the enterprises, it is the Micro and small ones that should get the focus of the Government programmes. "Small industries form the backbone of a nation" – this is a slogan well heard in industrially developed nations.

Why are small industries important? A large manufacturer can take up items only for which there is a proven large scale demand and for which everything is in a mature state – product technology, acceptance by the market, production process, etc. It cannot experiment with new products or technologies, nor it can modify the appearance, quality or performance of a product quickly to respond to a varied market demand.

On the other hand small industries, particularly those initiated by technological innovators, are constantly experimenting with technology of product and technology of production. They try out new products to find out whether the market accepts these or not. They take all sorts of risks to usher in new products or processes. They can quickly and easily adjust themselves if there is a sudden shift in the market demand. They provide the platform where to build up management skills since a small error or two will not result in a huge loss. Since these technology based small industries innovate the technology needed, a network of backward linkage industries is created which never happens with turn-key large industries employing fully imported technology. When such small industries based on home grown technology face problems that they cannot solve, the entrepreneurs come to the Universities or other research organisations to get help. The much sought after University-Industry collaboration will happen only if such indigenous technology based small industries proliferate. These are the small industries based on whose results and experience gradually medium and large-scale industries grow. In fact the earlier efforts of small industries pave the way to large scale production. Sometimes when small industries, through their experimental process, come to a stage where their products or processes have shown potential in a large-scale industry, they are bought up and integrated by an existing large scale industry in order to expand its base.

If we look at the scenario in UK before their industrial revolution, we will find that the ingenuity of people in setting up small home grown technology based industries proliferated in a big way and this paved the way for their global superiority. Even to this day all the large names in global industry - Microsoft, Intel, Sony, IBM, Ford, Hewlett-Packard - all started small, some even in garages, and grew to global prominence within a lifetime. This brings out another subtle point, those industries prosper quickly which grow out of entrepreneurship of a technological innovator or a 'Technopreneur' a term coined up in the recent times. Such a technopreneur knows which direction to go with new ideas, which new product or a variation of an old product will be accepted by the market and is within their capability limits too. Technopreneurs can visualise new products which economists or an ordinary entrepreneur will never be able to visualise. Therefore micro and small industries can be considered as the experimental laboratory based on which large industries are established and sustained.

One aspect needs attention at this point. People should be allowed to use their ingenuity and intellect to have a control over both production and marketing of their products. For this, the products should be of such a nature that can be used by people in their own community in order to enhance their own quality of life. Once such activities are started, there will be multiple benefits. The use of new products that enhance the quality of life will open their horizon and change their outlook. They will know that it is possible to improve the life through technology and a desire will be created to use more products. This 'necessity' will stimulate invention and entrepreneurship. The desire to acquire such commodities that are almost within reach, will stimulate other economic activities. Exports will come eventually as a natural economic activity, when they have mastered the techniques and learnt management skills. Therefore "**Make local, sell local**" should be the prime slogan.

Therefore we need to create an atmosphere that allow flourishing of innovation in technology based industrial arena. Any regulatory requirement of the Government, however small and simple, will give the opportunity for corrupt officials to utilize it to their own personal gains, and we may not see an end to it in the near future. This puts us in a dilemma. For good administration any Government should know what its people are doing, it needs money for its sustenance and development projects, and also it should have some degree of control over the activities of the people. On the other hand the people who are assigned these jobs by the Government act immensely powerful following the colonial mindset which still pervades the society. People manning the Government (whether a democratic one or else) find the regulatory policies favourable to their self interests. Lack of education and awareness of one's right, and lack of proper policing and justice have made the situation worse. The author feels that weeding out corruption is a far-fetched programme, and under the present situations of the socio-political system, we do not see a possibility in the near future. So to be pragmatic, we have to design a system for promoting and nurturing small enterprises taking corruption among Government officials as granted.

The larger enterprises are affected less since the amount of 'bribe' to be paid constitute a small fraction of their income. On the other hand, for the small enterprises, even a 'minimum demand' may become a burden too great in comparison to their earnings. Besides, the small entrepreneurs are mostly less educated simple folks, and they can be easily threatened and harassed by the corrupt elements of the Government. Therefore what we need is shielding the small, the starter enterprises, from possible harassment of such corrupt Government officials. That is for such starter enterprises, all Government control should be relaxed as much as possible. This will allow the starter enterprises to proliferate and grow contributing directly to national economy which would far exceed the apparent loss of income suggested by such a policy. Besides when these enterprises would 'graduate' to larger establishments they will contribute to a vigorous growth in national GDP, and will be able to pay the Government the required taxes, much in excess to what the Government is getting now.

To incorporate other requirements like that of environment, labour interest, etc., for the starter enterprises these should be done through education, campaigning and persuasion. Any negative situation should be handled through local civil society bodies, not through any law or regulation. As mentioned above, corrupt elements in the Government will utilize any regulatory law to threaten and harass small starter enterprises.

8.4.2 Making small enterprises profitable through import tax rationalization

An enterprise cannot sustain, and the sector cannot survive and grow unless it can make cash-gains. A losing sector cannot be rejuvenated however input the Government may give. The products of the indigenous industries have to compete with readymade imported products. Again, in Bangladesh most of the raw materials of these products have to be imported. Actually, for Bangladesh, this is the window of opportunity as mentioned before. Therefore our policies should be such that we can import raw materials, or intermediate products at the lowest price, and by adding contributions from homegrown technology, can produce finished products to sell at high prices all over the world. Our people have the intellect and skill to take up such challenges, and we should utilize not only skill in labour, as targeted in most of the present policies, but should focus on the use of the intellectual capacity of our people. Therefore tax policies should be worked out carefully so that the local industries can have adequate protection against competing imported products.

8.4.3 How conventional VAT affects technology based industrialization adversely

VAT is said to promote competition among manufacturers reducing the cost of production. The question is, for which manufacturers? It is mainly for the large manufacturers for whom technology, production process, everything is in a mature state and there is an ensured market. They have to increase the efficiency through improvement in management only. On the other hand Small technology based industries like the small electrical and electronic ones are the nurseries of industry in any country. They experiment with technology of product, technology of production. Based on the results and experience of these industries, gradually medium and large scale industries will grow. Such risks cannot be undertaken by a large scale industry. Therefore it would be unwise to provoke these small technology innovating industries to become efficient through a VAT system. If it is done, they will simply have to drop out destroying the future of the country.

In Table 5.54 it has been shown that majority of the enterprises have mentioned VAT (Value Added Tax) as the major obstacle to the growth of industry. In the following paragraphs some specific arguments are presented to establish the case that the system of VAT affects technology based industrialization adversely.

i) In the current VAT system in Bangladesh one has to register individual product models including their raw material costs before putting it onto the market. Now a small electrical or electronic industry with technology innovation capability will experiment and try out new products every other day, to try market acceptance and to get feedback, since they have the requisite expertise and capability. It is impractical to get VAT registration for each of these new items separately before they become really successful products having a large demand. (Besides, one knows well how the registration process is riddled with corruption and harassment in Bangladesh)

ii) Innovative small manufacturers, particularly in the electronics subsector, can incorporate specialised features on individual items depending on customer demand which is a well established advantage of a small industry. Therefore each of their products can have almost infinite number of variations - in features, raw material cost and price. Now this cannot be handled under the existing VAT system which needs pre-registration of fixed models and prices as mentioned before.

iii) The technologically innovative small electronic industries commit quite a handsome amount into continuous R&D. This has also been pointed out through the survey. They have to cover this R&D cost by increasing the price of other items, which is counted as an added value in our taxation system. So R&D is being taxed indirectly through VAT, which should have been the other way round. Subsidies and grants for R&D are not practical solutions, as these are grabbed by influential people or groups. Rather, R&D promotion can be better done through VAT waiver and tax exemptions.

iv) The electrical and electronics industry is basically dependent on imported raw materials and components which are mostly of small unit size and have a great variety. So it is not practical for not only small, even for medium industries in Bangladesh to import such components directly. So they purchase these from the local market which is supplied by bulk component importers. Bulk importers bring items costing tens of millions of taka at one time while the small manufacturers purchase components costing thousands or at best lakhs at one time. Therefore it is an impractical proposition to ask the bulk importers to supply the small purchasers any papers related to VAT payment at import.
Again, the Government policy requires these importers to pay both 15% VAT and an advance trade VAT at 1.5% during import. Once something has been sold at 1.5% trade VAT, no further rebate claim can be made on those items by the customs policy.
Under both the above situations, a further 15% VAT has to be paid on these components at the sale of the locally manufactured electronic product, more than doubling the effective VAT on components to about 35% which is not at all conducive for local industrialization..

v) To improve the quality of products through healthy competition one needs Brand identification and widespread advertisement. The attitude of the tax officials is such that if a company has advertised, it must have sold a lot already without considering that advertisement is an investment for future sales. So the tax official do not trust their sales records and put a heavy penalty for mis-declaration. This exercise goes against the improvement of the quality of local technology based products and their healthy competition.

8.4.4 How other countries have handled VAT

i) UK, which pioneered the application of VAT system, has underscored the point that payment of VAT is very complex unless one has a double entry accounting system. Therefore they provided a flat rate system based on total turn-over in lieu of standard VAT for small businesses. Currently the ceiling for flat rate tax is a total yearly turn-over of 150,000 pounds sterling.

ii) In India standard VAT is applicable only to traders, not to manufacturers at all, irrespective of size. Small industries with yearly sales revenue of less than Rs.1crore, nothing has to be paid to the Government as tax or VAT. So much so, they do not even have to register with any Government department. Larger manufacturing and agricultural producers have to pay a flat rate 4% tax on total sales.

iii) In India no customs official can visit a small industry which pays yearly excise duty up to Rs.10 Lakh, without permission from higher authorities.

The complete waiver of tax and VAT for small industries, and not allowing customs officials to visit slightly larger small industries in India clrearly point to the fact that these measures were taken to prevent harassment of small industries by corrupt tax officials, which sometimes become a greater obstacle than payment of taxes. This understanding of the root causes has given the small entrepreneurs a freedom from inhibition, and which has given a large boost to their small industry. Today India's small industry contribute significantly to its industrial product and GDP, and it is the small industries which are taking India to greater strengths in the near future.

8.4.5 VAT regime in Bangladesh, at the root of working against industrialisation

In Bangladesh all industries have to pay VAT at 15% rate while traders and importers have been given an option to pay only 1.5% on total sales value based on a truncated VAT system. This system assumes that a trader will make a value addition of 10%, 15% VAT on which results in net 1.5% on total sales. This makes calculation and payment of VAT much simpler. However, no such option is provided to manufacturers except cottage industries as defined by NBR at rates described below.

A fixed rate turnover tax at a rate of 4% is applicable to cottage industries that were defined, a few years back, to have a fixed capital investment under Tk.5 lakh and a total yearly turnover of Tk.20 lakh. In 2007 budget, the fixed capital ceiling was enhanced to Tk. 7 lakh, but the turn-over ceiling remained unchanged. So this enhancement did not make things any better. In 2008 budget, the fixed capital ceiling has been enhanced to Tk. 15 lakh, but the total yearly turn-over ceiling has been increased to a meagre Tk.24 lakh, making the whole exercise pointless. It is impossible for an industry making a fixed capital investment of Tk.15 lakh to get a return on its investment by selling products worth only Tk. 24 lakh a year, i.e., Tk 2 lakh per month.

In the budget speech of 2000, 2.5% on total sales on truncated base as above for trading was proposed for electronic products excepting the assembly of Radio, Television and VCR. This provision was not withdrawn in the final Finance bill, but NBR did never take any steps to implement it either, in spite of repeated requests from stakeholders. On the other hand in 1998 NBR waived all import duties from ready made Computers and Solar PV systems and their accessories. Surprisingly, import duties on electronic components as raw materials of such devices and VAT on industries that produce the same devices were not waived. Altogether, local production of these devices had to bear net taxes between 60% to more than 100%. This had the effect that local industries that were already producing UPS of computers, battery charge controllers and inverters of solar PV systems had to shut down their production resulting in closure of many such industries.

The same story goes for the assembly industry of Television. Prior to 2002 a justifiable difference in import duty and VAT on finished TV and on its components and parts as completely knocked down kits were maintained which saw a huge expansion of this industry, bringing down the price to the affordability of the people in general. In 2002 budget this differential was substantially reduced which resulted in closure of almost all local assembly industries, except very large ones having renowned brand identifications. On pointing this out to the topmost officer of NBR this was corrected in 2003 budget, raising the hope of reviving this industry again, but soon after the transfer of the concerned top officer, NBR imposed 22.5% regulatory duties on the completely knocked down kits of Television, only three months before the budget in 2004, thus destroying all hopes of this industry. In 2004 budget, the import duties on finished TV and on its knocked down kits have been made exactly the same which has been continuing the same till today.

From the above stories it is clear that NBR of Bangladesh Government favours importing of finished products than the production of the same within the country, and this is the crucial point that needs to be addressed before taking any other action plans for the promotion of industry in Bangladesh.

Correct fiscal policies may rejuvenate a whole economic sector leading to large scale growth, while wrong fiscal policies can destroy the sector. The latter is precisely that which has happened to small industry, particularly to the technology based ones in Bangladesh. The policymakers (particularly NBR) should realize this responsibility; collecting revenue for the Government is not their only mission. Wrong fiscal policies (tax in particular) create an environment for Government officers to become corrupt, where they can harass the entrepreneurs to a great extent. This has happened through centuries in the country (since the British colonial period when the aim was to destroy local industry. Unfortunately, we have continued the same even after decades of independence). Therefore some of the following action plans, particularly the first three are aimed at eliminating opportunities for such harassment, for which there is no other alternative. As mentioned before, India realised this long back and waived small industries under a certain category of all taxes and VAT since 1991. With such facilitating policies their small industry has boomed over the last decades and has contributed mostly to their recent surge in economy that has made a significant impact in the global arena. Due to these reasons they can also export these

items at lower costs to Bangladesh. Having the same historical and cultural background, unless we take similar measures and fiscal policies, our industries will suffer a natural death, which we are already experiencing. If the present policies and attitudes in the Government continue, we are doomed as a nation.
Therefore the following action plan should be considered for immediate implementation in the fiscal policy sector if one wants promotion and growth of industries based on local technological design and capability.

8.5 Action plan

8.5.1 Removal of policy related obstacles

The policies of the Government are the foremost requirement to develop the industry of the country, and the existing ones are definitely not right for development of Electrical and Electronics sector, particularly of the small enterprises, as mentioned above. The promotional action plans cited later are directly related to the adoption and implementation of the policy related action plan first, given immediately below under 5.4.1 to 5.4.4.

The SME Foundation should take the role of a troubleshooter to find out policy related obstacles first through consultation with different manufacturers' associations and then take the role of a lobbyist to persuade high powered Government offices in order to remove such obstacles.

8.5.1.1 Rectification of Fiscal Policies

1. VAT and Corporate Income Tax have to be waived for small industrial enterprises (as defined by Industrial policy 2005) and initiated by Bangladeshi entrepreneurs so long they do not take any loans from formal banks. Industries based on investment from the remittances of non-resident Bangladeshis should also be waived of all taxes. However, industries based on foreign investment, whether in part or full, cannot get such facilities. When a micro or small industry enjoying such tax and VAT waiver takes a formal bank loan, or grows into a medium enterprise, this facility will no more be available.

2. For small industrial enterprises (as defined by Industrial policy 2005) which have taken loans from formal banks, an **<u>alternative simple option</u>** to standard VAT, based on total turnover, should be given. This may be set at 3% on total turnover. The entrepreneur would choose the option whether to pay through the standard procedure, or through the simpler turn-over procedure.

3. As a general rational tax policy, Total Tax Incidence (TTI) on the imported raw materials and components of the same product that are not made locally should be significantly less to allow a competitive edge to local production. However, in many items related to small technology based industry, electronics in particular, this has been reversed through decades, destroying such industries, as mentioned before. Such reversed import duties should be rectified immediately. However, any corrective action should be done objectively with a proper analysis of the total impact of the tax policies; the current practice of modifying a little, apparently to satisfy the proponents if they are very loud, is not expected from a national body as the NBR.

4. There should be a protective clause in the fiscal policy, that if the above tax rationalisation is not done in certain cases, the importers should be able to import raw materials of the same product paying not more than 60% of the duty on the similar finished products. This means that if import duty and VAT are waived on a finished product, import duty on its raw materials and components should automatically stand waived, as well as the VAT on the production on the same products.

5. Duty free import of electrical and electronic items under baggage rules should be abolished. (Several lakh people traveling back home carrying duty free items – are sold in the market harming the local industry)

6. The general policy should be not to allow the import of any technology based finished product at zero tax or VAT however important that product is. If necessary the Government can pay the duties back to certain organizations which it wants to provide with special support (such as computers and laboratory equipment to educational institutions)

7. Drafting of the fiscal policies should not be finalized by a Government body (like NBR) alone. There should be separate committees for different sectors comprising of Civil servants from the Government, representatives of the manufacturing, trading and importing associations who will make the first draft. For the final document, representatives from these committees, again from different backgrounds, should do it through combined efforts.

8.5.1.2 Anti dumping measures

Anti-dumping by other countries should be prevented through individual case to case actions. However, the Government trade bodies abroad should be more active in providing the required help since it may not be possible for local entrepreneurs to obtain necessary information and documentation to file such cases.

8.5.1.3 Go slow in regional and international trade contracts (BIMSTEC, SAFTA, WTO)

As our small manufacturing enterprises have not got the Government support that it needed over the last decades, while some neighbouring countries have gone much ahead through their pragmatic protective policies long before, our manufacturers will not be able to compete equally with those from the neighbouring countries if all the regional free trade contracts are made and implemented immediately. We should ask for some more time to get ourselves prepared so that we can play an active role in this new collaboration, rather than remaining as an onlooker and a consumer. The same should work out for international trade.

8.5.1.4 Deregulation of other mandatory policies

1. Registration: The Industrial Policy made in 1986 waived the requirement for industries to register which continues to this day. It was a bold and important decision and helped small industries to grow in the late eighties. Any obligatory requirement leads to corruption and harassment. Occasionally demand is made from some quarters these days, even from small industry associations, to reintroduce

registration requirement. However, this should never be made obligatory; it could be an optional requirement with some incentives.

2. Trade License: As mentioned above, to eliminate harassment to the starter enterprises Trade license requirement should be waived for the very small industries, particularly for which tax and VAT waiver has been proposed above.

3. Labour law requirements: In the initial phase of economic development all countries had relaxed labour laws. This particularly relates to child labour and working hours. If the industrial sector develops, opportunities for movement of workers between enterprises will grow, and this will automatically compel the owners to provide reasonable working environment and facilities. To achieve the desired conditions, counseling, campaigning and persuasion should be the tools, not strict laws or regulations. The latter will only lead to corruption and harassment of enterprises, and the working conditions will never improve.

4. Environmental clearance: This is another area which is very important, but again may lead to abuse if strict laws are adhered to. Again, counseling, campaigning and persuasion should be the tools, not strict laws or regulations.

8.5.2 Promotional steps

8.5.2.1 Priority in utility services (Electricity, gas, etc.)

Small manufacturing enterprises should get topmost priority in all utility services like electricity, gas, telephone, water & sewerage etc. and this should be communicated to all concerned. At present large industries are listed as priority customers but not small ones (this was the case for giving priority telephone connections, as found several years back).

8.5.2.2 Marketing of products

i) Co-operative marketing

Wholesale dealers and retailers exploit the small manufacturing enterprises. Therefore such small manufacturers' associations should be encouraged to organise co-operative marketing starting from local initiatives, then combining all of them into regional and countrywide initiative. The same can be done for export too. BSCIC or SME Foundation (SMEF) can provide necessary support.
ii) Exhibitions

There should be timely exhibitions regionally, nationally and internationally. Again the Government may provide support direct to relevant manufacturers' associations, through BSCIC and SMEF.
iii) Government Procurement, no packaged tender

A policy possibly still exists which bounds a Government or Semi-Government organization to purchase a locally made product if it satisfies the minimum quality requirements, and if the price is less than about 120% of the lowest foreign bidder in a tender. However, it is hardly implemented now, as the priority for local industries have been largely forgotten now. If the policy has been scrapped, which is unlikely, it should be redone and a reminder should be sent to all concerned authorities together with advertisements in newspapers for its effective implementation. Legal actions should be taken if procurements are done otherwise.

There have been instances where corrupt officials of certain organizations abused this policy by playing tricks with the clauses, and asking for packaged offers of many items rather than of individual items. This barred the small enterprises to participate in such tenders and personal gains were sought after through syndicated offers. Therefore all such tenders should never be packaged so that even a small firm may offer prices for individual items in a competitive way. Again since the small manufacturing enterprises are to be freed from any tax or VAT as proposed above, they should be allowed to participate without such documents, but VAT, which is ideally a tax on the consumer, may be taken from the purchasing organisation.

8.5.2.3 R&D and QC support

i) Setting up local R&D

For new product and process development, and for Quality Control (QC) the Government and Semi-Government agencies should be put to work. Organisations like Bangladesh Industrial Technical Assistance Centre (BITAC), Atomic Energy Research Establishment and Atomic Energy Centre, Bangladesh Council of Scientific and Industrial Research (BCSIR), Universities and the Polytechnic Institutes should be motivated in taking up programmes to provide such technical assistance for the Small entreprises, particularly in the light engineering, electronics and electrical sector, may be in return for a reasonable fee. Appropriate polices should be taken up for this purpose. It is of interest to note that BITAC and BCSIR was instituted to help industries, but the schemes did not work out so far as the major thrust of the Government was large industries or export oriented industries. These organizations can yield much better results if they are targeted to such small enterprises. Private R&D, QC and Business support Service Centres should also be promoted. The Government may provide support to such initiatives through respective manufacturers' associations.

ii) R&D support through tax relief

Sometimes policymakers talk of giving subsidies to promote R&D. In Bangladesh reality, most of the grants or subsidies are grabbed up by opportunity hunters, these hardly reach the deserving target. Therefore, the VAT and Tax relief proposed above should be also seen as covers for R&D expenditures, since almost all industries in the categories being discussed have to perform continuous R&D of some sort.

iii) Quality Control for imported products: role of BSTI

Many imported engineering based products, particularly in Electronics, are of less than standard quality. Some even lie about their specifications thus cheating consumers. Such practices are also sometimes done by local manufacturers. As a first step, steps should be taken to ascertain that all products, whether local or foreign, write their full specifications on the packaging cover and in an accompanied brochure. If independent tests find out disagreement between that claimed and the actual performance, actions should be taken against marketing of such products. The respective manufacturers' associations should take initiatives in this regard. BSTI has a role here, but sometimes low quality products are given certificates through corrupt practices. BSTI should be held responsible and punishable through a court of law if such practices are detected.

8.5.2.4 Business support facilities

In order to provide all types of assistance to entrepreneurs (with information on setting up, preparation of project proposals, sourcing of technology and machinery, raw materials, legal, etc.), business support facilities should be promoted in the private sector, which can provide the services in exchange for a fee. BSCIC and SMEF can also provide similar support.

8.5.2.5 Procurement of quality raw materials

Associations of small manufacturers should be encouraged to organise import of quality raw materials for their respective industry jointly. This may be done through the co-operatives mentioned before for marketing. The Government may provide LC and other support services to such joint imports.

8.5.2.6 Training of human resource, short term, long term

i) Short term:

Most of the engineering type small industries are set up by technology innovators and they can train their own workers. However, to improve their quality, the entrepreneurs should be provided with some training, and occasional refresher courses, either at home or abroad. The workers can get the training from the entrepreneurs in turn. Besides, exposing the entrepreners to industries in similar sectors abroad will give them new ideas which they may utilize to improve their own quality, production and management. BSCIC and SMEF can take initiatives to organize such trainings and visit programmes..

Training the workers directly is not very important. Already vocational training institutes exist which can prepare workers for such industries.

ii) Medium term:

In the scenario of Bangladesh, diploma engineers from Polytechnic institutes form the main source of entrepreneurs for small industries in light engineering, electronics and electrical sectors. In the short term, expert bodies formed through the Government can work to improve the curriculum of these institutes, so that they promote entrepreneurship. In electronics, manpower with degrees in engineering and Physics are also taking up entrepreneurship, and curriculum modification with the same view may be attempted.

iii) Long term:

The Government may consider appropriate curriculum in the general education in the secondary level, so that school dropouts may opt for small engineering industries. The number of diploma engineering institutes should be increased. Courses in the Universities should be adapted to the needs of technology based industries.

8.5.2.7 Financial support

Most of the small industries are initiated by own resources of the entrepreneur. However, at a certain stage extra funding is necessary. The following may be considered to this end.

i) Venture capital: Science &Technology, and Industry Ministry may provide

Science & Technology ministry usually provides some grants for Research and Developemnt work. However, in Bangladesh there is no formal arrangement for providing venture capitals to technology innovators. Grants do not produce financial discipline and do not evoke the challenging mentality in an entrepreneur. Therefore after a technology innovator wishes to commercially produce an item, he/she may need some venture capital as the success of the particular item is not yet ensured. Science &Technology Ministry, and Industry Ministry may offer venture capitals to technology innovators having demonstrated capability in innovative technology having potential for commercialization.

ii) Loans without collateral, with low interest rates

Formal institutional loans without collateral security are needed for small manufacturing enterprises which have reached a certain reasonable level. The existing collateral requirement is a big hindrance, particularly for the techno-entrepreneurs. They usually finish all their resources at the initial R&D and commercial trial phase. There should be some mechanism to consider the technical ability and relevant educational qualifications, entrepreneurial track record of growth, goodwill, etc. in monetary terms to serve as collaterals. As discussed before, a technical innovator who has a track record of entrepreneurial growth at least for two years makes a good candidate for loans, and the rates of success would be much higher than providing loans just based on collateral security following conventional methods.

The rates of interest should be kept low to support continued R&D expenditures for such technologically innovative industries.

Of course, just giving ‘orders’ to banks to provide loans, as is being done now, do not work, since the banks have to earn cash-gain at the end. At present necessary Government policy environment does not exist that can allow small industries to earn cash-gain. Therefore, banks are not interested to give loans to small industries, which is the real experience in Bangladesh. Therefore policy environment favourable to local engineering based industries is the prime requirement as has been discussed before.

iii) EEF availability

Electrical and Electronics industries should be brought under the purview of Entrepreneur Equity Fund (EEF) of Bangladesh bank.

iv) Cash incentives and duty drawback facilities to exports.

These should be made available to Light Engineering and Electronics industries, and that should be available with minimum hassle.

8.5.2.8. Reorganising of Government bodies

i) Science &Technology Ministry, and Industry Ministry

To promote indigenous R&D based small manufacturing enterprises, Science &Technology Ministry, and Industry Ministry should preferably merge together. Commerce ministry, of late, has been looking into the interests of medium and large industries. Therefore Industry ministry can turn its focus to small industries, and Science & Technology ministry should merge into one as well.

ii) Reconstitution of NBR, dispersal of authority

This is a very important recommendation. As mentioned before, NBR having authority over all fiscal activities of the Government behaves as a Semi-God, which can therefore easily be seized by corruption. Therefore the authorities presently vested with the NBR need to be dispersed. In fact no developed country has such authorities given to one single institution! Besides, the main mental make-up for NBR officials is maximization of tax collection, not development nor promotion of industry nor trade in the country. It is easy to envisage what would happen to a business firm if the Accountant is given the upper hand over the Marketing department and the Managing Director, as the mental makeup for each is different. For the country's development we need industrialization, particularly in the small levels, but that is not a headache for a person whose prime target is to collect as much tax as possible. The author proposes that the following measures be taken:

a) All budget and tax policies should be formulated by a separate body, completely isolated from the NBR, preferably under the Planning Ministry. Since it has to take care of the requirements of all other ministries like Education, Commerce, Industry, Agriculture, and so on, therefore it cannot be vested to one of these ministries only as used to be the case earlier when Tariff Commission under the Ministry of Commerce used to do the job.

b) The above body should have adequate research cells with data archiving facilities and should have manpower with various specialities, particularly in appropriate branches of technology. Besides, representatives of manufacturers' and traders' associations and subject experts from the civil society should be incorporated in the policy-making procedures.

c) The NBR shall have the responsibility of collecting taxes and filing cases for tax evasion to the appropriate courts, as suggested in the next proposal. Of course, NBR like all other organs of other ministries will send their opinions and feedback the concerned body responsible for budget and tax policy formulation.

d) All cases of tax evasion as filed by the NBR will be adjudged by an independent judiciary. To expedite such cases a separate branch of the judiciary may be earmarked for such purposes.

iii) Frequent changes in top Government positions should be stopped.
Frequent changes in the top positions of the Government departments cause serious harm to the national development programmes. Above the rank of a Joint Secretary, officals should not be transferred to other ministries as far as possible.

8.6 Last words

Proliferation of small (including micro and mini) industries throughout the country is the only way that we can reduce poverty, and lead the country into prosperity. There is no other way out. People have to be given the right environment where they themselves can fight poverty using their own intellect and skills, and where no one with the authority of the Government is going to stop them in this endeavour. In fact the Government does not have to spend any money at all for poverty alleviation. All it has to do is to simply waive the tax and VAT on small enterprises and publicise the decision.

Will it reduce Government earnings? At present the Government gets very little tax from such small industries as they have not proliferated. So waiving such taxes (and VAT in particular) will have negligible impact on the net revenue. On the other hand the spectacular growth these measures are expected to bring will trigger a vibrant economic growth which will automatically increase the revenue earnings manifold, create employment, and will take people out of their poverty, and top of all, will allow the nation to stand on its own foot with dignity.

This year the Government has allocate Tk 2000 crore to feed poor people, either through providing temporary jobs, or if jobs cannot be given, they will be given allowances for doing nothing. One thing is whether all the money will go to the needy. The second is that getting money without any challenge will make people lose confidence in their own ability, which eventually is going to sustain poverty for a long time. On the other hand by waiving the taxes and VAT on the very small industries, which we can compare with ‘baby plants’ as mentioned before, following recommendations in this document, we can rejuvenate local industry, restore people’s self confidence, and lead the nation to prosperity.

Basically the Government does not need to promote small manufacturing industries, all it has to do is to see that it does not pose an obstacle itself. The ingenuity and motivation of the people will do the rest. Well, to help, the Government can improve communications, ensure supply of electricity and gas, improve the law and order situation, and provide good education giving emphasis on science and technology, and that will create the magic!

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