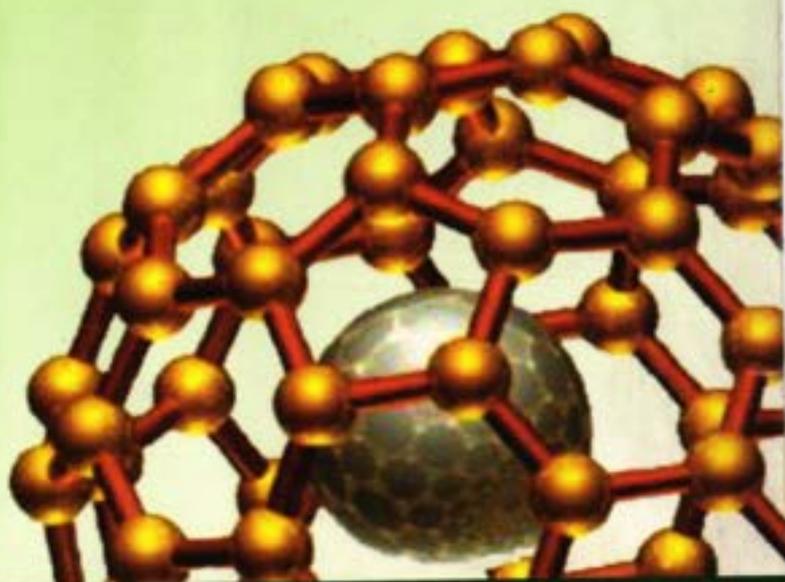


VISION 2021

**TO ACHIEVE
ACCEPTABLE QUALITY IN
CHEMICAL MEASUREMENTS**

A NATIONAL STRATEGY
FOR DEVELOPING CHEMICAL
METROLOGY INFRASTRUCTURE
OF BANGLADESH
(2009-2021)





VISION 2021

TO ACHIEVE ACCEPTABLE QUALITY IN CHEMICAL MEASUREMENTS

A National Strategy for
Developing Chemical Metrology
Infrastructure of Bangladesh
(2009-2021)



Bangladesh Council of Scientific & Industrial Research
Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh.

Ministry of Science and Information & Communication Technology

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Throughout the whole exercise quite a large number of people participated in the process. The authors are highly indebted to them all for their invaluable contribution (partial list of participants from the various levels are reflected in ANNEXURE-K & ANNEXURE-M). Among them there were leading scientists, professors, educationists, metrology experts, technologists, engineers, industrialists, trade and chamber representatives, policy makers, national and international experts in standards, metrology, testing, quality, accreditation and consumers affairs, civil society members, professionals, member of the diplomatic missions, regulators and civil service officials and media people.

The authors are expressing their heartfelt gratitude to the following organizations, for sending their representatives to discuss the issues at length during various meetings, seminars, workshops organized aiming to develop this National Chemical Metrology Strategy:

Bangladesh Accreditation Board (BAB)

Bangladesh Council of Scientific & Industrial Research (BCSIR)

Bangladesh Atomic Energy Commission (BAEC)

Bangladesh Standards & Testing Institution (BSTI)

Bangladesh Academy of Sciences (BAS)

Bangladesh Agricultural Research Institute (BARI)

Bangladesh Jute Research Institute (BJRI)

Federation of Bangladesh Chambers of Commerce & Industries (FBCCI)

Bangladesh Garments Manufacturers & Exporters Association (BGMEA)

Bangladesh Knitwear Manufacturers & Exporters Association (BKMEA)

Bangladesh Frozen Foods Exporters Association (BFFEA)

Bangladesh Agro-based Product Processors Association (BAPA)

Hortex Foundation

Dhaka University

National University

University of Asia Pacific

Southeast University

Technotel Ltd.

Department of Public Health Engineering (DPHE).

Power Development Board

Bangladesh Quality Support Programme, UNIDO

International Trade Centre (ITC)

Delegation of the European Commission to Dhaka, Bangladesh

PROTIPALOCK Society for Culture & Science (PSCS) and others.

Finally, the authors are expressing their extreme gratitude to the officers within ICSL, BCSIR, Ministry of Science & ICT.

Front Cover Picture

Hypothetical network of connected atoms around a heavier atom at the centre symbolizing the national chemical metrology infrastructure comprising the interconnected National and International Reference Laboratories in Chemistry around a National Reference Institute of Chemical Metrology (NRICTM) coordinating chemical metrology program of Bangladesh from the centre depicting a partnership based model for Metrology in Chemistry (MiC).

LIST OF ABBREVIATIONS

AERE	Atomic Energy Research Establishment
APLAC	Asia Pacific Laboratory Accreditation Cooperation
APMP	Asia Pacific Metrology Programme
ARV	Assigned Reference Value
ATLB	Association of Testing Laboratories Bangladesh
BAB	Bangladesh Accreditation Board
BACB	Bangladesh Association of Certification Bodies
BAEC	Bangladesh Atomic Energy Commission
BAPA	Bangladesh Agro-based Product Processors Association
BAPI	Bangladesh Association of Pharmaceuticals Industries
BCLT	Bangladesh College of Leather Technology
BCSIR	Bangladesh Council of Scientific & Industrial Research
BEST	Better Works & Standards Programme, EU-UNIDO
BFRI	Bangladesh Fisheries Research Institute
BGS	Bangladesh Geological Survey
BIPM	Bureau International des Poids et Mesures
BLRI	Bangladesh Livestock Research Institute
BQSP	Bangladesh Quality Support Programme, EU-UNIDO

BSTI	Bangladesh Standards and Testing Institution
CAB	Consumers Association of Bangladesh
CCC&I	Chittagong Chambers of Commerce & Industries
CCQM	Consultative Committee on Amount of Substance, BIPM
CIDA	Canadian International Development Authority
CIPM	Comité International des Poids et Mesure
CMC	Calibration and Measurement Capabilities
CRM	Certified Reference Material
DCCI	Dhaka Chamber of Commerce and Industries
DNRL	Designated Reference Laboratory in Chemistry
DoF	Department of Fisheries
DPHE	Department of Public Health Engineering
EA	European Accreditation
EC	European Commission
EOQ	European Organization for Quality
EPB	Export Promotion Bureau
EU	European Union
EUROMET	(EURAMET) European Collaboration in Measurement Standards
EURACHEM	Network of organisations in Europe dealing with chemical measurements
FAO	United Nations Food & Agriculture Organization
FBCCI	Federation of Bangladesh Chambers of Commerce & Industries
FIQC	Fisheries Inspection & Quality Control
GoB	Government of the People's Republic of Bangladesh
GTZ	German Technical Cooperation Agency
IAF	International Accreditation Forum
ICSL	Instrumentation Calibration Service Laboratory BCSIR
ICT	Information and Communication Technology
IFRD	Institute of Fuel Research & Development BCSIR
IFST	Institute of Food Science & Technology BCSIR
IGCRT	Institute of Glass & Ceramics Research Institute BCSIR
ILAC	International Laboratory Accreditation Cooperation
ILC	Interlaboratory Comparison
IPH	Institute of Public Health
IRMM	Institute for Reference Materials and Measurements

ITC	International Trade Centre
JICA	Japan International Cooperation Agency
KPI	Key Performance Indicator
LQMS	Laboratory Quality Management System
MI	Measuring Instruments
MoU	Memorandum of Understanding
MRA	Mutual Recognition Arrangement
NIST	The National Institute of Standards and Technology USA
NMI	National Metrology Institute
NORAD	Norwegian Cooperation Agency
NPLI	National Physical Laboratory India
NRICM	National Reference Institute of Chemical Metrology, ICSL, BCSIR
NSAPR	The National Strategy for Accelerated Poverty Reduction 2005
OIML	International Organization of Legal Metrology
PRSP	Poverty Reduction Strategy Paper
PSCS	PROTIPAALOCK Society for Culture and Science
PT	Proficiency Testing
PTB	Physikalisch-Technische Bundesanstalt Germany
QC	Quality Control
QMS	Quality Management System
R&D	Research and Development
RM	Reference Materials
RMG	Readymade Garments
SI	International System of Units
SMEs	Small and Medium-size Enterprises
SPS	Sanitary and Phytosanitary
SRDI	Soil Resource Development Institute
SRM	Standard Reference Material
SWOT	Strengths, Weaknesses, Opportunities and Treats
TBT	Technical Barriers to Trade
UNIDO	United Nations Industrial Development Organization
WELMEC	European Cooperation in Legal Metrology
WTO	World Trade Organization

GLOSSARY OF TERMS

Metrology

Is the science of measurements.

Chemical Metrology

Is the science of chemical measurements.

Scientific metrology

The part of metrology dealing with the organization and development of measurement standards and with their maintenance (highest level).

Industrial metrology

Has to ensure the adequate functioning of measurement instruments used in industry as well as in production and testing processes

Legal metrology

Is concerned with the accuracy of measurements where these have influence on the transparency of economical transactions, health and safety. This is indeed the verification of measuring equipment under mandatory/regulatory control.

Conformity assessment

Any procedure applied, directly or indirectly, to determine that the relevant specified requirements are fulfilled.

Measurement standard

Realization of the definition of a given quantity, with stated value and measurement uncertainty, used as a reference.

National measurement standard

Measurement standard designated as a national stated metrological reference.

Reference material

Material, sufficiently homogeneous and stable with respect to one or more specified quantities, used for the calibration of a measuring system, or for the assessment of a measurement procedure, or for assigning values and measurement uncertainties to quantities of the same kind for other materials. There are several kinds of reference materials, Standard Reference Materials (SRM), Certified Reference Materials (CRM), Matrix Matched CRM (MMCRM) etc. all are the products come from the "Reference Laboratory" activities using "Reference Method" within collaborative efforts.

Designated National Reference Laboratory in Chemical Metrology

The national reference (calibration) laboratory technically competent and expert in a particular chemical measurement designated by the government to produce, hold, and disseminate the reference materials for a particular matrix- analyte combination, to assign reference values, to provide traceability to an agreed reference materials and to provide calibration in that specific chemical measurement. This designated institute usually participates in the CIPM MRA as such performing the role of NMI for that specified area of chemical measurements embodying the national chemical metrology infrastructure.

National Reference Institute of Chemical Metrology (NRICM)

The designated national reference institute of chemical metrology ICSL BCSIR would be coordinating all the national chemical metrology programmes in the country and providing the national focal point in Chemical Metrology to the regional level at APMP and international level CCQM BIPM through participation in pilot scale, supplementary and key comparisons to earn CMCs so as to provide the traceability in chemical measurements to the all sector specific designated national reference laboratories from the highest level. This NRICM in ICSL BCSIR would be also providing and piloting the national PT and ILC Programmes in chemical measurements.

Traceability

Property of a measurement result relating the result to a stated metrological reference through an unbroken chain of calibrations of a measuring system or comparisons, each contributing to the stated measurement uncertainty.

Calibration

Operation establishing the relation between quantity values provided by measurement standards and the corresponding indications of a measuring system, carried out under specified conditions and including evaluation of measurement uncertainty.

DEDICATED TO

The Great Leader

&

The Father Of The Nation

Bangabandhu Sheikh Mujibur Rahman

And

His Family Members

And

The Millions Of Martyrs

who made their supreme sacrifice to have
our motherland independent from the
foreign invader, with an aim to free our
poor people from hunger, poverty and
deprivation

And the Firmament has He raised high and He has set up the system of measurements (of Justice). In order that ye may not transgress (due) measurements. So establish weight with justice and fall not short in the measurements.

-The Holy Quran Chapter:55 Verses: 7-9



MESSAGE



STATE-MINISTER

Ministry of Science and Information & Communication Technology
Government of the People's Republic of Bangladesh

With a vision to build a Digital Bangladesh by the year 2021, Her Excellency Sheikh Hasina's administration clearly stated that by the year 2017 Bangladesh will attain the national GDP growth rate to 10.0 from its present 5.5-6.0. To reach this goal Government has expressed its strong commitment to apply the science and information & communication technology, innovation as the essential tools to fight the poverty, to improve the quality of life, to protect the public health and environment as well as to facilitate the market access of Bangladeshi products to the developed economies, to ensure sustainable industrialization and development in this global trade regime.

Valid and reliable measurements in chemistry are fundamental to science and innovation. Thousands of Bangladeshi laboratories are conducting chemical measurements without acceptable, reliable, valid and internationally recognized quality. Production of quality chemical test results is not possible without chemical metrology infrastructure consisting of the National Reference Institute of Chemical Metrology (NRICM) coordinating the other Designated National Reference (Calibration) Laboratories in numerous sector specific fields in chemistry. Laboratory accreditation program is not gaining its expected momentum and having the risk of not having the sustainability in metrology activities due to the absence of this NRICM as well as the Reference Laboratories. Without the internationally recognized chemical metrology infrastructure, success of establishing the national quality infrastructure (NQI): standardization, metrology, testing, accreditation and quality would be far reaching goal for Bangladesh.

Recognizing this above essential national needs under an Annual Development Program ADP during 2008-2012, Government allocated 264.4 million BDT (~3.8 million USD) and started establishing the country's first national reference (calibration) laboratory for chemical measurement, namely, Instrumentation & Calibration Service Laboratory (ICSL) in BCSIR, Ministry of Science and ICT to be the nation's first cornerstone of the Chemical Metrology Infrastructure which will in turn be the

designated and competent National Reference Institute of Chemical Metrology (NRCM) for coordinating all national chemical metrology programmes building partnership with other national, regional and international metrology bodies.

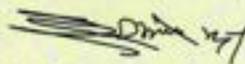
But Bangladesh should go far. More similar national reference (calibration) laboratories in many fields of chemistry should be established with a shared vision and direction. Based on the national priority fields, needs, capacity and competency in chemical measurements, these Designated National Reference Laboratories (DNRL) would be ultimately operational to facilitate the national Metrology in Chemistry (MIC) infrastructure. Here comes the need of formulating a national strategy in this sector. To provide a definite goals, objectives, vision, mission and direction with its dynamic leadership ICSL BCSIR came forward to prepare this First National Strategy for Developing National Chemical Metrology Infrastructure for Bangladesh with an assistance from the Ministry of Science and ICT under the Special Allocation Project (Ref: Special Allocation Project of Ministry of Science and Information & Communication Technology (No. MOSICT/ section-9/ Biaanuupra-22/2008-2009/747(8)).

The most impressive part of this national policy document is that: it has identified seven (07) priority fields in chemistry and confirmed the strategic option to set up the Decentralized Partnership Based Infrastructure for Chemical Metrology of Bangladesh based on the technological and international requirements, national needs, capacity, resource availability and competency.

It is my immense pleasure to know that with rigorous study, consultation and needs assessment the ICSL has come up with this First National Chemical Metrology Strategy paper containing guiding principles to be used by the Government under the able leadership of Ministry of Science and ICT.

My heartfelt congratulations to ICSL BCSIR and all concerned for taking this historic initiative in formulating this National Chemical Metrology Strategy as such to provide a direction for the nation striving to earn financial, economic and intellectual emancipation to be ultimately the "Sonar Bangla : The Golden Bengal" in reality.

Dhaka
29 Paush 1417/ 12 January 2011



Arch. Yeafesh Osman
State-Minister

Ministry of Science and Information
& Communication Technology
Government of the People's Republic of Bangladesh



FOREWARD



SECRETARY

Ministry of Science and Information & Communication Technology
Government of the People's Republic of Bangladesh

For many years we are talking of setting National Reference Laboratories in Bangladesh. But the country was lacking the proper guiding principles, direction and strategy based on a technical needs assessment study. Only when the country faces any crisis e.g. arsenic in drinking water, radioactivity in milk and foods, nitrofurans and antibiotic residues in shrimp and fisheries, melamine in milk, toxic chemicals/ adulterations in foods and drinks we become aware of the need for reliable testing, certification and conformity assessment requirements. Textile, leather, jute, tea, plastic & light engineering products, glass, ceramics and cements, pharmaceuticals are struggling to maintain the market access to the developed economies. Thousands of clinical diagnostic laboratories are producing test results for patient management of unknown quality. When different laboratories produce varying results for a same parameter we have to go to foreign reference laboratories to compare these results. These practices are neither sustainable nor efficient to address the national pressing needs and requirements.

Without a well designed national chemical metrology program, without setting up a coordinating and designated National Reference Institute of Chemical Metrology (NRICM) and a number of other competent Designated National Reference Laboratories (DNRL) in chemistry it would not be possible to have the chemical measurement results acceptable, traceable, reliable and valid from these thousands of testing laboratories operating in the country. Moreover the chemical metrology: the science of chemical measurements underpinning the science and innovation as well as technology transfer helps ensuring the sustainable industrialization to accelerate the poverty reduction. Ministry of Science and Information & Communication Technology takes the pride to assist in developing such a National Strategy for the first time in the country.

It is my immense pleasure to know that with its able leadership ICSL BCSIR formulated the First National Strategy for Developing the National Chemical Metrology Infrastructure for Bangladesh. It was indeed the demand of time and ICSL passed a milestone.

Now the nation has a vision and direction and I must appreciate the fact that this policy document has identified seven (07) priority fields in chemistry and aiming to set up the Decentralized Partnership Based Infrastructure for Chemical Metrology of Bangladesh based on the technological and international requirements, national needs, capacity, resource availability and competency.

During the formulation process, I am confident that, the ICSL Study Team applied appropriate tools and techniques to accommodate the inputs from all relevant stakeholders: scientific and learned societies, public and private, national and international, developing partners and UN agencies through formal-informal communications, intra- and inter-ministerial consultative meetings.

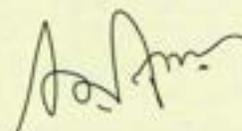
To confirm the ownership we do endorse this First National Strategy as an important guiding document and it is our firm commitment that Ministry of Science and ICT will take the lead to initiate the necessary actions to coordinate and implement this strategy with close collaboration-cooperation with other concerned ministries and institutions and stakeholders.

Needless to say that nothing is perfect and there are, of course, some scopes to have this first national strategy to be further improved. Further resources, time and expert efforts would be needed and more ownership would be earned via persuading all concerned stakeholders to make this guiding document more practical and target oriented.

At this very auspicious moment of launching of this First National Strategy for Developing the Chemical Metrology Infrastructure of Bangladesh, I am expressing my thankful appreciation to ICSL BCSIR for their commendable contribution having national importance.

Dhaka

29 Paush 1417/ 12 January 2011



Md. Abdur Rob Howlader
Secretary

Ministry of Science and Information
& Communication Technology
Government of the People's Republic of Bangladesh



MESSAGE



CHAIRMAN

Bangladesh Council of Scientific & Industrial Research
Ministry of Science and Information & Communication Technology
Government of the People's Republic of Bangladesh

It is my great pleasure to see the nation's first endeavor in preparing the National Strategy for Developing the Chemical Metrology Infrastructure of Bangladesh. I do congratulate the Team Leader Dr. Mala Khan a young scientist in BCSIR and her expert team members for doing this commendable task. The Ministry of Science and Information & Communication Technology is embodying the biggest national testing, measurement and technology service infrastructure in science, innovation and industries. It is thus obvious that this ministry would be taking the leadership to formulate such an important national guiding document.

More than 85% national chemical testing, measurements and quality control services are provided to the industries, consumers, scientific research and academic communities, except the clinical testing, from this Ministry of Science & ICT. There are more than 400 labs, divisions, sections operating within the two key public institutions: Bangladesh Council of Scientific & Industrial Research (BCSIR) and Bangladesh Atomic Energy Commission (BAEC).

To have the chemical measurement system reliable and to have the national accreditation program sustainable, it is indispensable to build a national chemical metrology infrastructure.

Following this national road map I hope that within ICSL BCSIR the National Reference Institute of Chemical Metrology (NRICM) as well as a number of other National Reference Laboratories would be built up on partnership basis within other national organizations to cover the seven priority chemical fields as identified in this study. Through coordination of NRICM in ICSL BCSIR, these designated Reference Laboratories would be providing calibration to the chemical testing techniques having traceability to the agreed and certified reference materials and or international system of measurements. These Designated National Reference Laboratories would be responsible for production and dissemination of Certified Reference Materials (CRMs), launching periodic Proficiency Testing and Inter-laboratory Comparison and other "piloting" activities in analytical

sciences and chemistry with the leadership of envisioned NRICM in ICSL BCSIR in cooperation with other national, regional and international partners in Metrology in Chemistry (MIC).

The concept of a metrology infrastructure for chemical measurements is novel in the country. However, the success of this concept relies on a centered and coordinated participation of the government, scientific communities, academia, industries and international partners.

We are happy to see that the GoB is very keen to implement the National Strategy for Chemical Metrology and has already allocated 264.4 million BDT (~3.8 million USD) to set up the First National Reference Laboratory in food, pharmaceutical and environmental chemistry in ICSL-BCSIR by the year 2014. EU, NORAD, GTZ and UNIDO have also agreed to extend their support to ICSL-BCSIR through a technical assistance project, namely Better Works and Standard Programme (BEST) aiming to have the National Chemical Metrology program. I thank them for their kind support.

I am confident that this new national journey would be considered to be a breakthrough in the development of the technical infrastructure for the country.

I wish a success of this technical movement towards achieving the highest technical competence in chemical measurements and in setting the reference point in the national mind.

Dhaka
19 Paush 1417/ 02 January 2011



Prof. Dr. SM Imamul Haq
Chairman

Bangladesh Council of Scientific & Industrial Research
Ministry of Science and Information
& Communication Technology
Government of the People's Republic of Bangladesh

PREAMBLE

The Policy Matrix 3 of The National Strategy for Accelerated Poverty Reduction [NSAPR 2005, page 247 and page 251] clearly defined two Strategic Goals 2 & 3 for Easing Supply Constraint and Improving Business Support Services with two Key Targets: Facilitating Technology Development and Improvement of standards and quality control respectively. In an effort to reach these two Key Targets under Ministry of Science and Information & Communication Technology in the year 2008-2009, the Government of the People's Republic of Bangladesh (GoB) granted a four-years long 2008-2012 Annual Development Project "Development of ISO/IEC 17025 Accredited Instrumentation & Calibration Service Laboratory for Chemical Measurements" to be implemented by Instrumentation & Calibration Service Laboratory (ICSL), BCSIR with a cost of Taka 242.0 million (-USD3.00 million). By implementing this action within ICSL BCSIR, Government has taken a serious move for the first time in the history of Bangladesh to initiate a national program in the field of Chemical Metrology and earned a wide appreciation from national and international communities, stakeholders, industries, academia, civil-consumers societies and international development partners including EU, UNIDO, NORAD, GTZ, CIDA, ITC.

On the way to develop this government funded Annual Development Project (ADP) on 02 September 2007 the Team Leader Dr. Mala Khan along with other member Mr. KM Mostafa Anwar delivered a keynote speech to present a roadmap for developing the national infrastructure for Metrology in Chemistry (MiC) program on the occasion of the National Seminar on Development of National Chemical Metrology Infrastructure. In Bangladesh that is the first ever historic event held on Metrology in Chemistry (MiC) organized by Bangladesh Academy of Sciences (BAS) with a support from PROTIPALOCK Society for Culture and Science (PSCS) and Bangladesh Council of Scientific and Industrial Research (BCSIR), Ministry of Science and Information & Communication Technology

where Mr. Tapan Chowdhury, Honorable Advisor for the Ministry of Science and Information & Communication Technology and Dr. CS Karim, Honorable Advisor for the Ministry of Fisheries and Livestock and SM Wahid-uz-Zaman, Honorable Secretary, Ministry of Science and Information & Communication Technology were present as the Chief Guest, Special Guest and Guest of Honor respectively and Prof. Dr. M. Shamsheer Ali, President of Bangladesh Academy of Sciences (BAS) was on the Chair. More than 150 delegates from think tank, scientific communities, public and private universities, industries, government departments, civil and consumers societies, media including Bangladesh Standards and Testing Institution (BSTI), Bangladesh Council of Scientific and Industrial Research (BCSIR), Bangladesh Accreditation Board (BAB), Bangladesh Academy of Sciences (BAS), Bangladesh Atomic Energy Commission (BAEC), University of Asia Pacific (UAP), Southeast University (SEU), Dhaka University (DU), Fisheries Inspection & Quality Control (FIQC), BQSP (EU-UNIDO), Consumers Association of Bangladesh (CAB) were present to support and discuss the actions at length to develop the national infrastructure for chemical metrology. The action received huge appreciation, support and media coverage. Journey towards developing the partnership based decentralized national infrastructure for Metrology in Chemistry (MiC) starts in Bangladesh from 2007 with the first GoB grant BDT 242.0 million (2007-2012) to setting up ICSL BCSIR to be the first National Reference Laboratory in Chemistry.

ICSL BCSIR headed by the Principal Investigator and Project Director Dr. Mala Khan continued the action in developing the national chemical metrology infrastructure and in the year 2008-2009 Ministry of Science and Information & Communication Technology awarded a grant under Special Allocation in Science Information and Communication Technology (Ref: Ministry of Science and Information & Communication Technology (No. MOSICT/section-9/ Biaanupra-22/2008-2009/747 (8))) providing a mandate to prepare this National Strategy for Developing Chemical Metrology Infrastructure of Bangladesh.

This National Strategy for Developing Chemical Metrology Infrastructure of Bangladesh - the 'chemical metrology strategy', in short, is the outcome of thorough investigations, brainstorming, and extensive process of strategic thinking that has included more than one thousands national-international studies, investigations to conduct an exploratory research. On formulating this Strategy the Study Team from ICSL BCSIR studied metrology, quality and conformity assessment systems of more than 40 countries/economies all over the world, accumulated more than 1000 (one thousand) national-international reports, laws and regulations, scientific literature, publications (Chapter 6: Selected Bibliography), opinions, national-international experts' views, communications with export promotion authorities, chamber and trade associations, recommendations from industry-civil-consumers societies, development partners, UN agencies and private-public stakeholders active in the field of the national and international quality and conformity assessment Infrastructure (NQI). The final result is unique in many aspects.

Some of them can be listed as follows:

- It is the country's first ever effort to draft a strategy for developing the national infrastructure for Metrology in Chemistry.

- it is founded on an extensively studied vision about the future development of the partnership based decentralized National Chemical Metrology system of Bangladesh that unites the public administration, academia, the scientific community and industrial end-users in the widest possible range.
- it has opted for the opportunity for the first time in the country to assess the country status in chemical measurements as such this study also prepared a questionnaire (ANNEXURE-A) which will be used to conduct a comprehensive national Needs Assessment Survey in Chemical Measurements so as to estimate the size/volume of the chemical measurement activities and to identify the priority areas.
- this study came up with a questionnaire (ANNEXURE-B) for the first time in Bangladesh to assess the calibration needs and distributed among more than 250 industries and laboratories involved in chemical measurements and Industrial Quality Control (QC).
- this study has identified the needs of developing a national database of the laboratories involved in testing and physico-chemical measurements. If implemented, the National Database of the Laboratories operational in Bangladesh in turn would be an asset for the nation.
- applies an economic needs-driven approach that should foster the efficiency of the nationally available chemical metrological services;
- allows a consistent development of the national quality and conformity assessment infrastructure, that is essential to ensure the consumers' rights, to secure the safety of the environment and public health and to facilitate the access of the Bangladeshi products to the domestic and international markets, to secure the sustainable industrial growth so as to create the wealth to accelerate the poverty reduction.

The national chemical metrology infrastructure is an essential element of any economy desiring to be industrialized or aiming to be. As such, it provides substantial basis for science, innovation, technology development, fundamental Research and Development activities, trade facilitation, accreditation and quality control, market access via removing the potential technical barriers to trade. No matter how "invisible" the national measurement infrastructure might appear to an external observer, the importance of the activities that it accommodates is remarkable.

The list of examples is endless, but as an illustration it is worth mentioning some of them:

- None of our next generation in Bangladesh would be secure from the presence of melamine in the imported powder milk/ infant formula without precise, accurate and reliable measurements of each consignment of milk and milk products.
- Ensuring the safe and quality foods would be impossible without having the measurement, control of contaminants, trace metals etc. in the food and drinks.

- As we have seen from the Arsenic crisis, preserving the public health would be clearly impossible without developing reliable measurement capabilities for contaminants in the ground water. The same is even more valid in the case of measuring the contaminants and hazards in the air, water and soil from industrial waste.
- Shrimp and fisheries sectors are struggling to retain its markets and not gaining much access to the, say, EU market passing the Rapid Alert System introduced by EU (ANNEXURE-C) without having each and every consignment checked via reliable, acceptable and valid measurements of the presence of antibiotic and veterinary drug residues.
- Traditional Bangladeshi exporting industries, such as RMG & Textile, leather- jute and tea, growing industries, such as agro-based horticulture, pharmaceuticals, food-processing etc, are facing severe challenges for not having national technical arrangement for traceable, reliable and internationally acceptable measurements in chemistry.
- Energy being a global matter, reliable flow measurement capabilities for petrol and natural gas are strategically important fields. This is valid from the point of view of an importing country, but also at the level of ensuring reliable measurements at gas-stations, through the optics of consumer protection.

Short-listing few (out of many) practical illustrations of the importance that a proper national chemical measurement infrastructure has for the overall development of the economy brings only part of the answers that this strategy is addressing. The complementary part of the dilemmas concerns the effectiveness and efficiency of a given scope of domestically available measurement capabilities. This is a key driver for strategic decisions to be made at the national level.

On a micro-scale, one part of the answer can be contained in the fact that all Bangladeshi tax-payers jointly finance the costs of maintaining a proper measurement infrastructure. Therefore, there is a clear interest to ensure that the best output is delivered by each taka of tax contributions to activities that literally affect the performance of the national economy and the quality of life of Bangladeshi citizens.

On a macro-scale, the answers to these dilemmas are highlighted within this document that provides the framework of the National Strategy in the field of Chemical Metrology for the People's Republic of Bangladesh.

Experiencing the non-response to the distributed questionnaire (only less than 1.0%) from the 250 industries and the laboratories, we have applied the methodology of the exploratory research in the elaboration of this Strategy upon establishing a three members Study Team lead by the Principle Investigator Dr. Mala Khan with other associate investigators Mr. KM Mostafa Anwar and Dr. M. Akram Hossain. The Study Team played the leading role in identifying the national needs in the field of chemical metrology, conducting a SWOT analysis of the existing system, listing the priorities for future development and selecting appropriate strategic actions. In the framework of this process, the industrial end-users, laboratories and certification bodies nation-wide have contributed

through answering communications, as well as participating to individual interviews and consultations.

The Study Team members participated, conducted, and attended a series of national, regional and international events: meetings, seminars, workshops, conferences, study missions to understand the industrial requirements, to record the exporters' problems, to assess the country status in chemical measurements, instrumentation & calibration service requirements and laboratory management system, accreditation-standards-quality management status.

Under the leadership of ICSSL, BCSIR the Study Team organized the Consultative Workshop on 30 June 2009 to present the First Draft National Strategy for Developing the Chemical Metrology Infrastructure of Bangladesh for collecting further invaluable comments, guidance, inputs and supports to improve further before finalizing this National Strategy for adoption by the Government.

Finally on 26 July 2009 the final Draft National Strategy presented by the Principal Investigator Dr. Mala Khan through an inter-ministerial meeting. More than 90 (ANNEXURE-M) participants: leading scientists, professors, educationists, metrology experts, technologist, engineers, industrialists, trade and chamber representatives, policy makers, national and international experts were present to discuss and support the *National Chemical Metrology Strategy*.

The above mentioned draft **Strategy** was first published by ICSSL BCSIR in December 2009 for adoption and acceptance by the Ministry of Science & ICT. Finally, in January 2011 Ministry of Science & ICT adopted and launched this document to be the National guiding and policy strategy paper for developing the national chemical metrology infrastructure of Bangladesh.

The guiding idea of this strategy is to serve the best purpose of supporting the widest range of our economy through raising the level of competitiveness. Equally important, the Strategy should foster a National Chemical Metrology Infrastructure that continuously improves the quality of life. Along these lines, this Strategy is perfectly aligned with the consensually agreed overall strategic objectives of The People's Republic of Bangladesh stated in the national PRSP document The National Strategy for Accelerated Poverty Reduction-II (Revised) FY 2009-11 and the Vision 2021 expressed by the Present Government and the Honorable Finance Minister in his Budget Speech to the National Parliament on 11 June 2009 to increase and sustain the GDP growth rate at 10.0 by 2017 with a support from innovation and advanced technology.

METROLOGY IN CHEMISTRY

1.0 INTRODUCTION

In his budget speech to the Bangladesh National Parliament on 11 June 2009, The Honorable Finance Minister expressed the Government's firm commitment to increase and sustain the GDP growth from its existing 5.5-6.0 to 10.0 by 2017 with a vision that "Bangladesh will reach a trajectory of high-performing growth supported by advanced and innovative technology" aiming to building up the Digital Bangladesh by 2021 when the country will celebrate its 50th birth anniversary.

The question is: how this projected GDP growth rate of 10.00 almost double would be achieved from the current 5.0-6.0 whereas the global economy is passing through a recession? How the advanced and innovative technology will come to support this macroeconomic growth? Is there any particular sector where Government should allocate resources, and can add a relatively higher growth rate in comparison with other sector to reduce the poverty with truly accelerated rate to achieve the millennium development goals? We have very specified and confirmed answers to these vital questions. After the World War-II, in the last sixty years, the global communities have observed a remarkable trend in the economic and business activities. The investigations revealed the astounding fact that *an economy can achieve an additional 2-7% growth in GDP, if that economy pumps only 1.0% of its GDP in the area of national quality infrastructure comprising standards, metrology, accreditation, quality and compliances underpinning the innovation, science and technology, and industrialization, facilitating trade and ensuring market access, securing well being of consumers, environment and public health as such providing a sustainable growth through creating wealth.*

Box-1.1: Excerpt from the Budget Speech to the National Parliament by Honorable Minister, Ministry of Finance, Government of People's Republic of Bangladesh, Internet version pp2-3, <http://www.mof.gov.bd>

- "7. We would like to proceed with a Vision of a happy and prosperous nation rising above all prejudice and parochialism. The year 2021 will mark the Golden Jubilee of our independence. Again, in 2020 the nation will observe the centenary of the Father of the Nation. Before that a major milestone of UN Millennium Development Goals has to be achieved by 2015. *The Vision envisages that by 2021, Bangladesh will reach a trajectory of high-performing growth supported by advanced and innovative technology with prices of commodities stabilized, income and human poverty brought to a minimum level, health and education for all secured and capacity building combined with creativity enhanced, social justice established, social disparity reduced, participatory democracy firmly rooted and capacity to tackle the adverse effects of climate change achieved. Information and communication technology will, by that time, take us to new heights of excellence giving the country a new identity to be branded as Digital Bangladesh.*
8. *In the pursuit of achieving our Vision, the targets that we have set for the macro-economy are (a) to secure and sustained level of GDP growth of 10 percent from 2017, (b) to raise the present share of Industry from 28 percent to 40 percent of GDP (c) to increase life expectancy of citizens to 70 years, (d) to reduce maternal mortality to 1.5 percent and (e) to scale down child mortality to 15 per thousand births. Our target is to reduce the rate of unemployment by 15 percent and also bring down the percentage of disadvantaged people living below the poverty line to 15 percent."*

1.1 Economics of Measurements

It has been estimated that in the industrialized economy 4-6% of the national GDP is being spent in testing and measurements with at least 3.0-3.8 % of GDP is being spent to cover the cost of chemical measurements. Within industries -12-15% of the production cost is related to measurements and compliance with standards. It has also been estimated that even in the highly developed economies 3-35% chemical measurements are unreliable and hence garbage carrying no information incurring a direct economic loss. For not having established reliable metrology, quality and conformity assessment infrastructure, in the developing economies this rate is of course very high. The bottom line is: "being a poor is costly indeed". The cost of unreliable chemical measurements and losses are manifold: direct and indirect. Cost of opportunity is even much more serious: both tangible and intangible and can hinder the national development, industrialization and growth and can act as the potential technical barriers to trade under WTO regime, can jeopardize the public health, safety and environment, consumers rights.

Increasing standardization and technical regulations by the importing economies, awareness among the consumers, increasing knowledge of risks to health and environment left the producers and marketers with the severe challenges. Safety, quality and fitness-for-the purposes of any products are being assessed against standards and technical regulations. Gaining market access of products and services are extremely dependent on standards, testing, quality, inspection, certification, accreditation and metrology.

It is worthwhile to note that the technical and regulatory infrastructure of a country must assume certain characteristics before one may expect to derive maximum benefit from international standards, accreditation, national quality and conformity assessments infrastructure:

- **Access to Metrology Services:** it is critical to establish the metrology infrastructure, both in mandatory legal metrology and voluntary industrial, scientific, chemical metrology and facilities for traceable calibration of laboratory equipment;
- **Access to Reliable Testing Laboratories:** competent testing laboratories, whether government or private, with up-to-date and effective laboratory quality management system LQMS are essential;
- **Access to Education in Analytical Sciences:** trained personnel, both for laboratories and for government agencies (e.g. regulators) should be generated through approximation of suitable course curricula and nationwide technical training/education program;
- **Adaptive simple enforceable legislation:** it is imperative to assume an adaptive, simple, well-established regulatory regime, organized at national level and determining the roles of government agencies, mandatory regulations enforcing regulatory policing bodies, voluntary conformity assessment technical bodies, market surveillance, and inspection and control bodies. These organizations both in public and private should be operational independently to avoid the potential conflict of interests. Legislations should be to promote competing environment on a level play ground. For country like Bangladesh changed and redefined relationships have been recommended to approximate the relationship between national public technical organizations involved in conformity assessment activities and line Government Ministries to meet the international best practices and norms. Separation and independence of regulatory functions from the technical conformity assessment functions are absolutely necessary to ensure transparency.

1.2. Metrology in Chemistry (MiC)

Metrology is defined as the "science of measurements". Over the past 50 years or so, a huge scientific development has been experienced in the generic and sectorial areas of chemical measurement and testing in order to develop quality systems and to put in place globally a measurement and testing infrastructure. The development of an overall system for metrology in chemistry (MiC) will necessitate building on past achievements, developing synergy and exchanging expertise between the various categories of laboratories in the sectorial areas.

The ability to make accurate, reliable, valid and acceptable measurements appeared to be critical for trade and industrialization, protecting health and safety of the population, plants, animals and environments, protecting consumers' rights and establishing social justice. This measurement ability is the pivot around which trade, commerce and society revolve.

Every year millions of chemical measurements are done for a wide variety of purposes within and outside the country and important decisions are also based on a huge number of measurements.

Examples of these purposes include:

- safeguarding the quality of food and the purity of air,
- developing new products and materials, such as pharmaceuticals or ceramics,
- monitoring conformity assessment and product specification,
- protecting the consumer against fraud and counterfeit products,
- assisting hospital physicians with medical diagnoses,
- supporting the justice system in the fight against drugs and organized crime,
- providing forensic evidence for litigation,
- gathering revenue for Governments (Customs and Excise),
- underpinning the free movement of goods within the regional and international market and trade agreements with third countries.
- providing the testing framework for education, research and development in science, innovation and technology

Thus, chemical analysis spans a wide variety of activities and has important social and economic consequences. Undertaking reliable chemical analysis is, however, complicated by the dependence of the chemical measurement process on the sample matrix and in many instances the necessity to separate the analyte from the sample matrix. The instrumental measurements used for virtually all applications do not usually take place directly on the original sample; they are often the final step of a complex analytical method involving chemical pretreatment (destruction of the sample matrix) or separation of the analyte from the sample matrix. Hence, in most applications calibration of the instrument is insufficient in-order to achieve reliable and comparable analytical results.

The sample matrix problem has given rise to the development of two approaches to achieving reliable and comparable chemical measurements:

- matrix reference materials and
- inter-laboratory comparisons.

The matrix-matched, certified reference material (CRM) is a unique type of chemical standard commonly used to validate the complete measurement methods and is sometimes used for instrumental calibration. Such standards are prepared to correspond to each required analyte/matrix combination and while there are thousands of CRMs in use, there are still many strategic areas where reference materials are not yet available but required particularly in relation to manufacturing industry, trade, health and the environment. The production of CRMs is technical knowledge intensive activities as well as costly and time consuming. Hence many highly technical organizations: reference laboratory network throughout the world are involved in the process of production, certification, holding and dissemination of CRM based on partnership and cooperation. It is necessary to ensure that their role in the traceability chain is fully recognized and utilized and that a synergy is developed between the various partner "reference laboratories".

Similarly, inter-laboratory comparisons are undertaken for each relevant analyte/matrix combination in order to establish comparability of their measurement data. These comparisons range from 'round robin' studies, which collaboratively test a new method, to formal proficiency testing (PT) schemes which assess agreement between laboratories on an on-going basis. It is impracticable to organize comparisons for every routine application or to organize a world-wide comparison involving all the laboratories requiring comparability for each measurement application.

Mechanisms are required which will permit interlinking (overlapping) of regional and national PT schemes. These problems have long been recognized as a significant technical and economic limitation in delivering sound chemical analytical data. The situation is continually being exacerbated with increasing demand from purchasers of data and by regulators for proven comparability of measurements. Global expansion of trade under WTO regime, means more countries and more laboratories need to be brought into each inter-laboratory comparison. In addition, increasing numbers of measurements are used in support of regulations, for which there is an expanding requirement for rigorously proven reliability and comparability. Finally, increasing use of sub-contracted measurements, due to commercial pressures on laboratories, requires not only conformity of contractors to quality systems but also demonstration of the comparability of data from different contractors.

To ensure reliable and comparable chemical measurements in the 21st Century, it is necessary to have unified national/regional/international systems in place which will enable analysts to attain and demonstrate the comparability and traceability of their measurements. In order to achieve this goal it is essential to have a "measurement and testing infrastructure". The building blocks of this system are:

- Validated methods
- Procedures for determining measurement uncertainty
- Procedures and tools for establishing traceability
- Pure substance reference materials and calibration standards
- Matrix reference materials
- Proficiency testing
- Third party accreditation to an international standard

Metrology in Chemistry is concerned with the development of a structured support system based on traceable standards and analogous to the systems that have been used to underpin physical measurements for over 100 years." Chemical measurements have developed more or less on a sectorial basis and in a different culture, so that in very many cases the laboratory support systems developed for physical measurements by National Measurement Institutes (NMIs) cannot easily be applied to the field of chemical or indeed biological measurements.

However, common areas do exist and there are measurement problems in chemistry which are similar to those experienced with physical measurements. These include the difficulty of obtaining

reliable estimations of measurement uncertainty and the frequent disparity between calibration standards and the "real" samples or artifact on which measurements are made.

Some of the problems are being addressed at the highest level through the CCQM (Consultative Committee on Amount of Substance), EUROMET and EURACHEM. Others are being addressed in sectorial areas where a "bottom up" approach is being adopted.

This approach is based on quality systems, CRMs, PT and laboratory accreditation (ISO/IEC 17025) coupled to a laboratory networking system. This approach is widely adopted in the food and agricultural fields and in certain instances is underpinned by legislation.

There is a need for a coordinating role by the Government within the framework of National Strategy for Chemical Metrology in Bangladesh and supporting activities and programme, to facilitate and harmonize those developments.

A two pronged approach is required

1. The development of a harmonized Bangladeshi National Chemical Metrology Infrastructure for all sectors of chemical measurement, which will contribute to and be compatible with systems being developed around the world. This work should be carried out in close co-operation with national institutions like BSTI, BCSIR, BAEC, DOE, BARI, BIRRI, FIQC and as well as regional and international cooperation in metrology like APMP, APMP DEC, CCQM.
2. Disseminating traceability and the principle of metrology in chemistry from the top level to the working level by developing, demonstrating and evaluating concepts, systems, strategies and tools.

Some work areas requiring attention in both 1 and 2 above are:

- Evaluation and development of measurement uncertainty strategies and procedures.
- Development of traceability strategies and initiation of demonstrator projects showing how traceability could be achieved from high level international standards to working level measurements.
- Development of high level (primary) reference materials.
- Development of reference values for proficiency testing schemes
- Evaluation of Bangladesh Government legislation with regard to metrology and conformity assessment and measurements and development of relevant regional and international "key comparisons" to assist trade and other cross border issues.
- Education and training for metrology in chemistry.
- Development and validation of method including primary methods.
- Development and validation of pre-treatment techniques as a means of managing matrix effects in analytical methods.
- Technology transfer and networking between primary and reference measurement laboratories.

- Development of metrological standards and tools for biotechnology applications (analytical molecular biology and microbiological measurements).

In order to make progress it is recommended that priority should be given to the following areas:

- a. The development of a National Strategy for Metrology in Chemistry in Bangladesh.
- b. Dissemination of traceability from Designated National Reference Laboratories to the service providing laboratories.
- c. Development of the metrological tools necessary to attain the above.

1.3 Journey to Establish National Quality Infrastructure

Bangladesh having its GDP size -USD 100.0 billion secured a stable growth of 5.5-6.5% in the past decade has shifted from its agriculture based economy to industry based economy with a contribution of 28% to its GDP from the industries has experienced remarkable growth (~12%) in the industries. But in comparison with other sectors science & technology and innovation, standards, metrology received less attention. Even less than 0.05% of the GDP has been spent in this sector. Only recently in the year 2006 GoB initiated a quite comprehensive four-years project (2006-2009), namely, Bangladesh Quality Support Programme (BQSP) implemented by UNIDO and ITC funded by European Union under a country framework agreement in the area of Trade Related Technical Assistance (TRTA) where EU-NORAD-UNIDO-ITC jointly funded the project for a total of EURO13.5 million.

In the first place this BQSP, aiming to improve the National Quality Infrastructure, strengthening the shrimp and fisheries inspection and quality control, improving the competitiveness in the Textile and Ready Made Garments (RMG) sector and developing the strategies for Export Diversification, established a firm basis to invest further in this technology intensive "soft" infrastructure and created sufficient awareness among all the stakeholders to look into the area where country needs urgent and huge invest.

It has been envisioned that it is just a beginning of a journey towards achieving an acceptable national measurement systems by the year 2021. In the meantime, as a follow-up action of BQSP, EU-NORAD-UNIDO has already agreed to provide TRTA EURO 16.5million in the year 2010-2014 to implement Better Works and Better Standards (BEST) programme to improve further the national quality infrastructure (NQI).

1.4 Success of BQSP: EU UNIDO Technical Assistance

Through Bangladesh Quality Support Programme (BQSP), the national journey started in 2006 to establish Bangladesh Accreditation Board (BAB) with enactment of Accreditation Act (16 July 2006), to enact Consumers' Rights Protection Law (1 April 2009), revised Fish Inspection and Quality Control Rules 2008. BSTI received plenty of technical support to improve its standards and certification mark scheme. In the field of metrology within BSTI the physical metrology laboratory established has been to provide calibration services in the selected physical parameters: mass, temperature, length, volume, density, time and frequency with highest accuracies at the national level.

With these limited fields, this is the only calibration laboratory in physical measurements that will help establish the traceability to SI units through other NMIs (NMI Australia, PTB Germany, NPL UK, DKD Germany, NIST USA) and will pave the path of national accreditation actions in the country to some extent. To establish a full-fledged R&D based independent NMLB (NML Bangladesh), it is necessary to pump more funding in the field of metrology in physical measurements. As Metrology Wing of BSTI does not have any experience in R&D in physical and chemical measurement science it would be difficult to establish an NMLB within BSTI keeping its existing legal and institutional framework unless otherwise it is separated fully to have intensive scientific/technical actions operational.

Without costly rigorous scientific and technical arrangement within an NMI it is not possible to enter into CIPM MRA through signing Meter Convention to become the holder of the National Primary Standards. Although legally empowered, BSTI with its existing institutional and technical framework does not have that technical capacity to be a Primary Standards Holder even in the physical measurements. GoB should look into the matter seriously.

To recognize the GoB initiative in the field of Chemical Metrology, in the year 2010-2014 under BEST programme EU-UNIDO has agreed to support Chemical Metrology action of ICSL BCSIR in developing Metrology in Chemistry (MIC) for foods and pharmaceuticals.

Based on this study and assessment it has been confirmed that on priority basis the country is in need of much more actions, technical assistances and allocations through Annual Development Project (ADP) within other national expert institutes under different line ministries to establish a truly decentralized partnership based chemical metrology infrastructure which would in turn be networking among the "designated national reference (calibration) laboratories for chemical measurements" and would be entering into to CIPM MRA via participating BIPM CCQM and APMP key/pilot and supplementary comparisons. ICSL BCSIR may take the leadership in coordinating this action in Metrology in Chemistry (MIC) and ultimately would be the designated National Reference Intitute of Chemical Metrology (NRCM).

1.5 Why Strategy for National Chemical Metrology?

Metrology, the science of measurement critically affects standards, technical regulations and conformity assessment activities and plays a crucial role in development of society. Measurements, as well as the entire quality infrastructure, have become an increasingly critical tool for national and international trade, and for removing technical barriers to global trade

Hence, National government should take responsibility for ensuring the establishment and proper functioning of a credible chemical metrology system, including setting regulations for the legal applications of metrology, developing standards for measurement and calibration, preparing regulations for measuring instruments used by producers, testing laboratory and the general public. The resources required to develop this infrastructure represent a significant part of the R&D investments of each modern economy.

Formulating a consensual national vision in such a complex field requires an extensively multidimensional approach. Tradition, available human resources, industrial structure, existing centers of testing, economic policy priorities, overall competitiveness of the economy are only some of the basic dimensions that have a direct impact on the National Strategy. The development of an adequate national measurement system and related conformity assessment components is furthermore initiated under the hypothesis of obtaining optimal results from available financial resources, whether it concerns National budget or possibilities for external sources (including funding by UNIDO, European Union and NORAD under Trade Related Technical Assistance TRTA actions etc.)

Finally, this is meant to offer solid ground for future decisions on investment policy to be based on. Implementation of the strategy should result in improvement of technical capacity in innovation, research and adopting advanced technology of the People's Republic of Bangladesh to be an envisioned Digital Bangladesh by 2021 through support and upgrade of quality infrastructure compliant with requirements of the ISO, BIPM, CCQM, APMP, ILAC, IAF, APLAC and strengthening the competitiveness of Bangladeshi economy.

The strategy development process has been conducted under the leadership of the Instrumentation & Calibration Service Laboratory ICSL of BCSIR while accumulating the inputs from the major stakeholders such as the Ministry of Science and Information & Communication Technology, Ministry of Industries, Ministry of Commerce, Ministry of Health and Family Planning, Ministry of Fisheries and Livestock, Ministry of Finance, Federation of Bangladesh Chambers of Commerce and Industries (FBCCI), Dhaka Chambers of Commerce and Industries (DCCI), Chittagong Chamber of Commerce and Industries (CCC&I), Bangladesh Association of Pharmaceuticals Industries (BAPI), Association of Testing Laboratories Bangladesh (ATLB), Bangladesh Association of Certification Bodies (BACB), Export Promotion Bureau (EPB), as well as the highest learned and scientific body Bangladesh Academy of Sciences (BAS) and leading Scientific Research Institutes, Public and Private Universities, development partners and National-International Expert of Bangladesh Quality Support Programme BQSP, EU, UNIDO, CIDA, JICA, FAO.

As BETTER MEASUREMENTS ensures the BETTER REGULATIONS, it is illusive to discuss any fostering of innovation, science & technology, highly technology-intensive industry on a national scale if the measurements perspective is kept out of the decision-making equation on the highest level. Based on the PRSP "National Strategy for the Accelerated Poverty Reduction NSAPR 2005", the People's Republic of Bangladesh steers towards dynamic and knowledge-based macro-economic model. It is the one that is based on high added-value industrial outputs and where the mastering of technologies is the core substance.

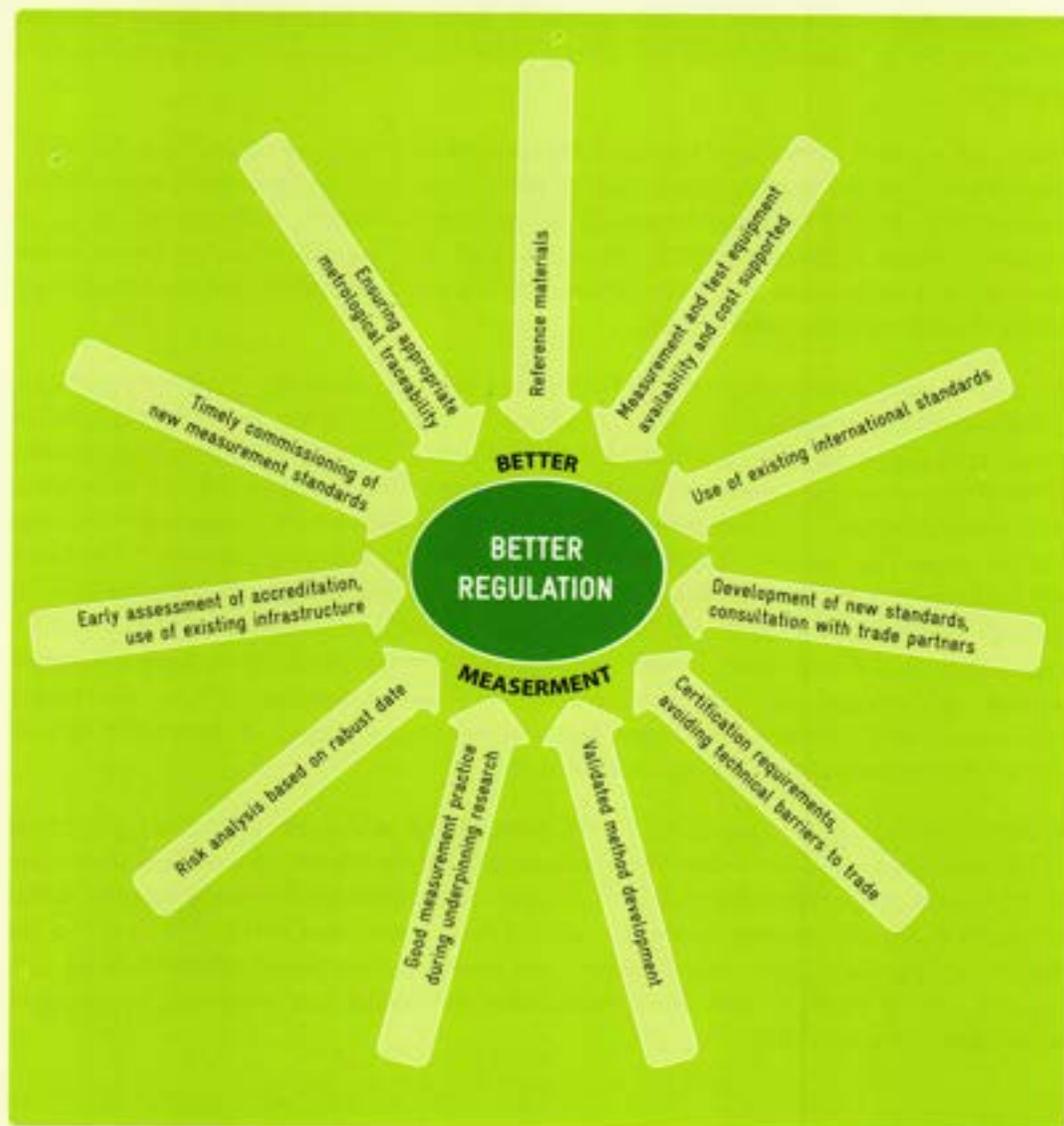


Fig.1-1: Better measurement ensures better regulations

2.0 TESTING NEEDS EXAMPLE IN FOOD & AGRO-BASED INDUSTRIES

Just to have a quick understanding in the overall demand of the chemical measurements we have taken only the single important sector: food & agro-based industries including shrimp and fisheries.

We can also identify the needs of chemical measurements for the other sectors: textile, jute and leather, plastic-ceramic and light engineering, herbal medicine and pharmaceuticals, building and construction, water and environment, clinical diagnostics. The export oriented food and agro-processed products industries major chemical testing requirements are summarized in this section. For the imported food and drinks and agro-processed products are to be tested as per the GoB issued import policy order and BSTI mandatory certification marking scheme.

The mandatory tests and certification required by the importers and their regulatory agencies and/or Bangladesh customs are the following:

- a. Phytosanitary certificate
- b. Health certificate
- c. Conformity certificate
- d. Nutrition Test

The voluntary tests and certificates are:

- e. Poisonous contaminants test
- f. Microbiological test
- g. Maximum residue level test
- h. Radiation test

The voluntary tests and certifications are either required by the local exporting companies or by the importer or by the producers themselves.

In the ANNEXURE-E more than 55 main national testing laboratories have been tabulated with their main equipment. These laboratories are providing more than 90% of the national testing services in chemistry external to the producers. QAQC laboratories internal to the industries are of course not in this list. A further detailed study is necessary to assess the actual measurement capacity of these laboratories providing the measurements services.

To conduct a baseline survey tools & techniques as well as a Terms of Reference and Questionnaire has been developed (ANNEXURE-A). This chemical measurement needs and capacity should be assessed to identify the gap and to set up the priority. Development of a National Database of the Laboratories has also been envisioned to implement this Strategy.

Major Physico-Chemical Measurements for food products listed (Annexure-F) and partial list of parameters have been summarized in the Box-2.1 & Box-2.2.

BSTI controls 51 food items under mandatory certification scheme and also some other requirements of chemical measurements stated in the Pure Food Ordinance-1959 and its Amendments 2005 also.

The summary of the chemical measurements requirements as per the Pure Food Ordinance has been listed in the Annexure-F.

A partial list of technical/testing requirements (TBT & SPS related) set by EU, USA, Japan have been listed in the Annexure-G to assume the technical barriers to trade for Bangladeshi producers.

In the ANNEXURE - C it has been tabulated that EU introduced weekly Rapid Alert System has identified contamination in several consignments of Bangladeshi shrimp and fisheries and processed food products at different European Port of Entry during the June 2003 - December 2007. Recognizing the serious non-compliance issues and to protect the consumers rights, from May 2009 to November 2009 GoB has imposed temporary ban on the shrimp and fisheries export towards European direction, incurring a huge (-USD 100.0 million) direct loss to the industry.

Box-2.1: Examples of Chemical Measurements Needed for Food Products (both import, export & domestic requirements)

Products	Analytes [Physico-chemical]
Juices	Brix, Total soluble solids, TS (Total solids), Water activity, Pulp content in Juices Residual preservatives (Benzoic acid, Sulfur-di-oxide), Heavy metals (As, Pb, Cu, Zn, Fe, Sn) Pesticide Residues, Essential oils Microbiology: Yeast/Mold, Shigella, Salmonella and other microbial contaminants
Drinks	Brix, Total soluble solids, TS (Total solids), Water activity, Pulp content in Juices Residual preservatives (Benzoic acid, Sulfur-di-oxide), Heavy metals (As, Pb, Cu, Zn, Fe, Sn) Pesticide residues, Essential oils Microbiology: Yeast/Mold, Shigella, Salmonella and other microbial contaminants
Drinking Water	pH, Conductivity, Free Carbon-di-oxide (as CO ₂), Total Dissolved Solids (TDS), Hardness (as CO ₃), Flouride (as F), Nitrate (as NO ₃), Nitrite (as NO ₂), Cyanide (CN) Chromium (Cr), Cadmium (as Cd), Copper (Cu), Lead (as Pb), Mercury (as Hg), Arsenic (as As) etc. Microbiology: Total Coliform, Fecal Coliform, Standard Plate Count, Escherichia Coli, Fecal Streptococci, Staphylococci, S. Aureus, Sulphite reducing bacteria, Pseudomonas, Salmonella and Shigella
Canned Soft Drinks	Heavy Metal (As, Pb, Cu, Zn, Fe, Sn), Caffeine, Iron content, Microbiology, Vitamins Dissolve oxygen in finished products
Milk and milk Products	Fat, Protein, Lactose, Ash content, Titratable acidity (as Lactic acid), Solid non fat (SNF), CLR (Correct lactometer reading), Density g/ml, Total solids content, Total Sugar content, Solubility test, solubility index of milk powder, Urea Test Microbiology: Total coliform count, Total colony count, spor count, bacillus, Staphylococcus and Mycobacterium tuberculosis, Yeast / Mold
Biscuits	Residual Vitamins and minerals, Fat content, Protein content, Free fatty acid (As oleic acid), Peroxide Value, Gluten, Fiber content etc.
Chips and Chanachur	Aflatoxin, Sudan dye-color (come from chili), Protein content, Iron (Fe), Fat content, Acid value of extracted fat, Total ash, Lead (Pb), Arsenic (As)
Jam/Jelly	Viscosity test
Sauce/Ketchup	Viscosity test, Free flow test, Heavy metals (As, Pb, Cu, Zn, Fe, Sn)
Spices	Aflatoxin (B1, B1, B2, G1, G2), Sudan dye (color), Yeast and Mould, Crude fiber, Protein, Oleoresin, Capsicum, Colouring agents, Ascorbic acid, Heavy metals (As, Pb, Cu, Zn, Fe, Sn) Pesticide Residues :- Quinolphos, Acephate, Triazophos, Cypermethrin, Dicofof, Mancozeb, Dieldrin, Diazinon, BHC, Chlordane, Heptachlor, Cypermethrin, Malathion, Parathion etc.
Candy (Soft, Hard, Chewy)	Moisture Content, Fat content, Glucose, Sugar, Fructose ratio, Sulphated ash, Acid insoluble ash, Sulfur-di-oxide, Vitamins and Minerals
Noodles	Vitamins and minerals, Gluten
Mustard Oil, Pickle	Acid Value, Saponification value, Iodine value, Peroxide value, Euricic acid, Sudan dye, Benzopyrine, Allyl isothiocyanate,
Packaging Flexible Foil	Barrier Properties: Oxygen, Nitrogen, Carbon-di-oxide, Permiability test
Cartoons	GSM test, Corrugation test, Bursting strength test, Compression test, Load bearing test etc.

Box-2.2: Measurements Needed for Shrimp & Fisheries Industries

Products	Analytes [Physico-chemical]
Shrimp, Fisheries, Fish Feed, Soil, Water & Sediment	<p>A-1: Stilbens, their derivatives, salts and esters</p> <p>A-3 : Steroids</p> <p>A-6 : Antibiotics- Chloramphenicol, Nitrofurantoin and its metabolites, tetracycline</p> <p>B-1 : Anti-bacterial substances Sulphonamides, Quinolones</p> <p>B-2a : Anthelmintics</p> <p>B-3 : Organochlorine compounds- Pesticides</p> <p>B-3c : Chemical elements- Heavy Metals</p> <p>B-3d : Mycotoxins</p> <p>B-3e : Dyes- Melachite Green, Crystal, Crystal violet</p>
Shrimp & Fisheries (Microbiology)	Standard Plate Count (SPC), Total coliform, Fecal Coliform, Salmonellae, Vibrio cholerae, Vibrio parahaemolyticus, Staphylococcus aureus, Streptococci
Ice, Water, Environmental Monitoring	<p>Temperature, pH, Conductivity, Turbidity, Salinity, Alkalinity, Dissolved Oxygen, Bicarbonate, Hardness, Total Dissolved Solids (TDS), Fluoride (as F), Nitrate(as NO₃), Nitrite(as NO₂), Cyanide (CN)</p> <p>Ammonia, Iron, Chromium (Cr), Cadmium (as Cd), Copper (Cu), Lead (as Pb), Mercury (as Hg), Arsenic (as As) etc.</p> <p>Total Coliform, Fecal Coliform, Standard Plate Count, Escherichia Coli, Fecal Streptococci, Staphylococci, S. aureus, Pseudomonas, Salmonella and Shigella</p>
Others	Organoleptic/ Freshness test, Filth test, Moisture content for dry fish and fish scale, Total Volatile Nitrogen (TVN)
References :	<ul style="list-style-type: none"> * Fish and Fish Products (Inspection and Quality Control) Ordinance (1983) and amendment (2008) * Fish and Fish Products (Inspection and Quality Control) Rules (1989 & 1997) * Fish Feed & Animal Feed Act (2010) * Fish Hatchery Act (2010) * EU Directives : 2377/91/EEC, 96/23/EC, 2002/32/EC

2.1 Gap Analyses: Existing Chemical Metrology Service

As it has discussed earlier that in Bangladesh these chemical metrology services are not available to ensure the traceability, the testing laboratories in general create calibration curve using the in-house working standards prepared from the commercially available standards without certificate to ensure the traceability and often without declaration of uncertainty. Use of CRMs is limited if not nil. In the Fig-2.1 & Fig-2.2 the big gap has been depicted.

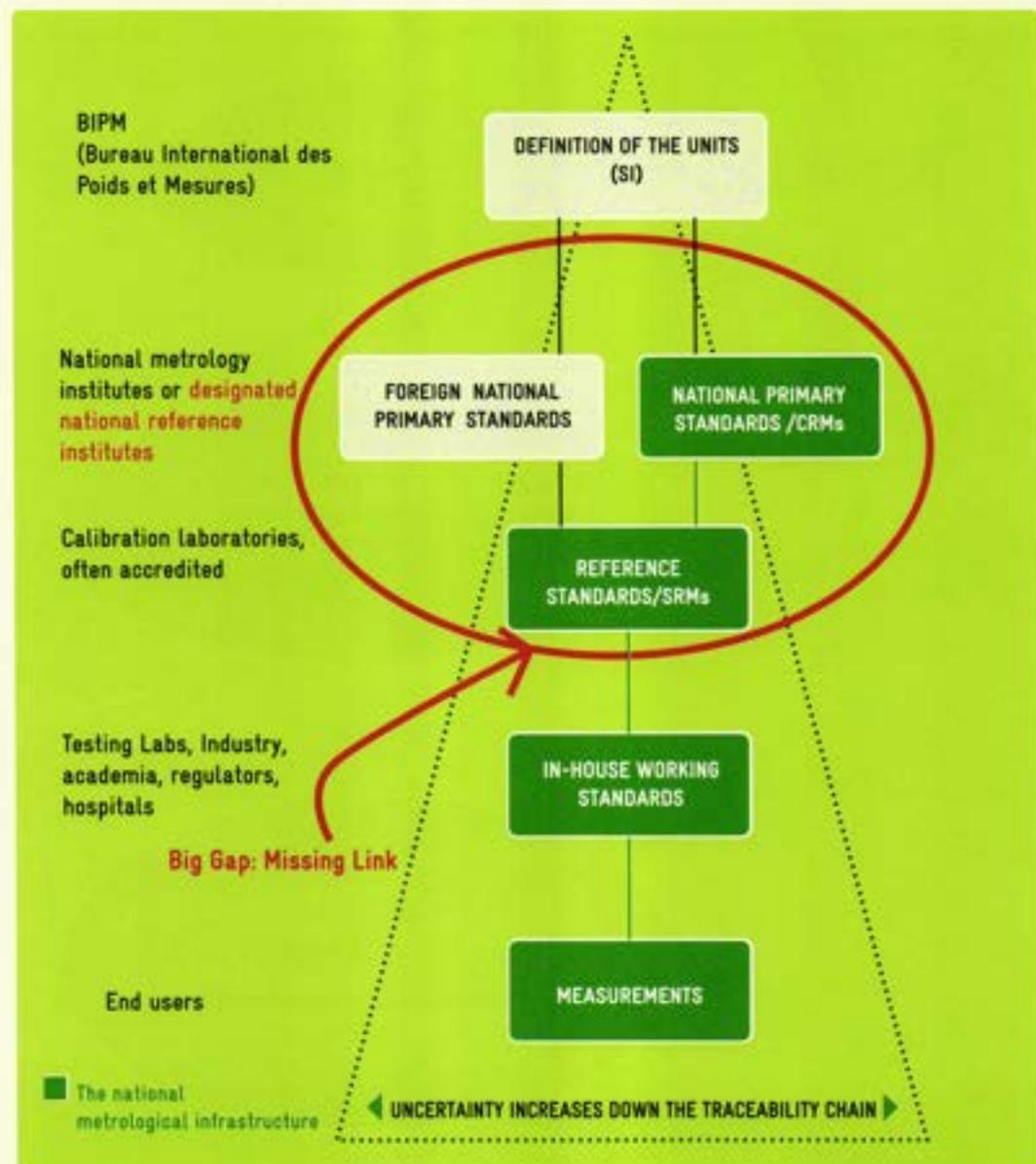


Fig-2.1: National Metrology Infrastructure: Bangladesh with a big gap and no traceability in chemical measurements

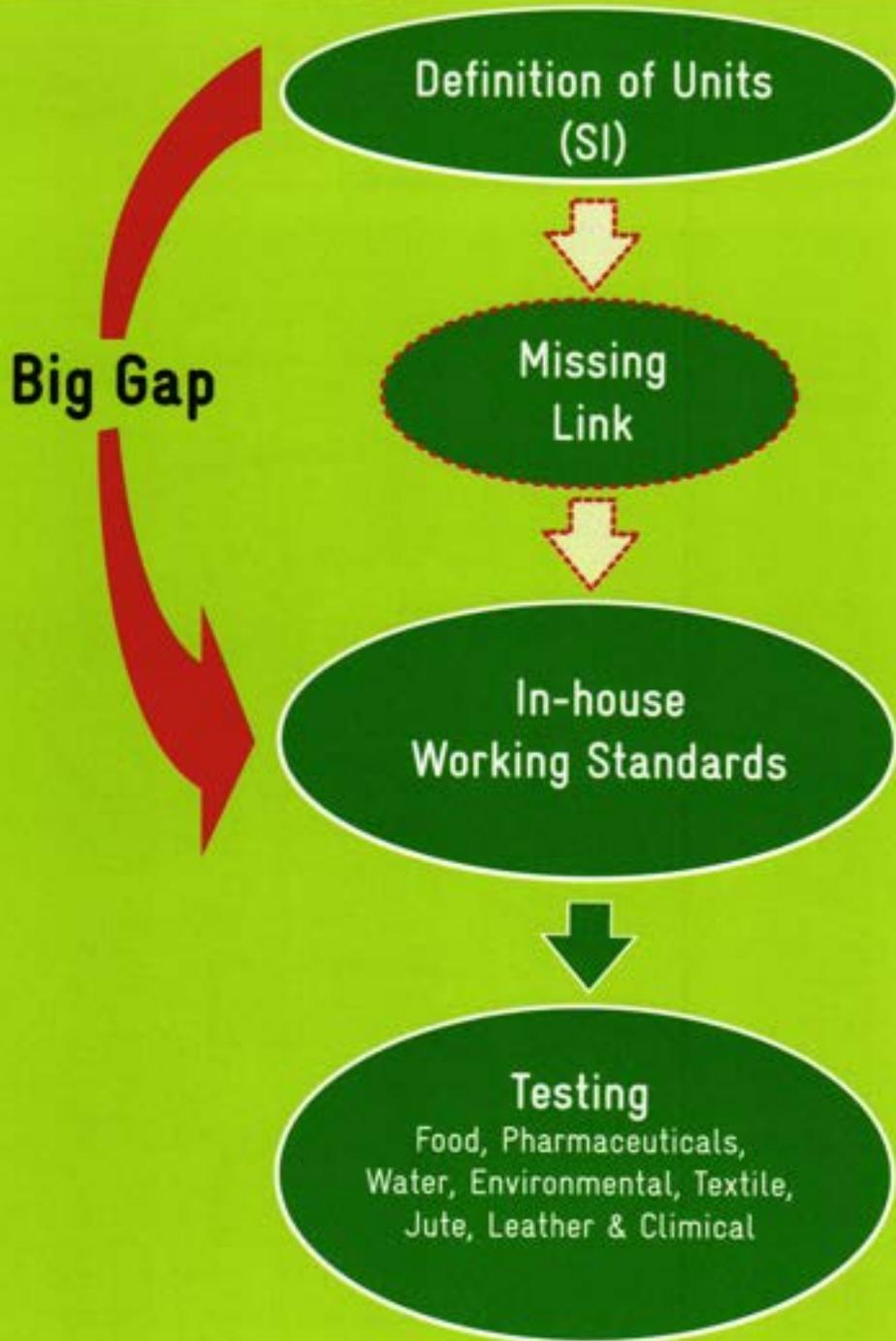


Fig-2.2: This National Strategy is for Bridging the Missing Link

3.0 INTRODUCTION

Upon rigorous exploratory research the author analyzed the macro and micro environmental forces playing the critical roles in the field of chemical metrology. National and international trading and legal framework is demanding the development of national reference laboratories in chemistry. It has clearly been evident that in Bangladesh there is no designated National Reference (Calibration) Laboratory in Chemical Measurements specially to provide traceability to the chemical measurements services in the food, pharmaceuticals, horticulture & agro-based products, leather and jute, light engineering products & building materials, medical gas manufacturing and clinical diagnostic sectors etc. Numerous research findings shows that in Bangladesh there is an urgent need of reference laboratory services to protect people from adulterated foods, to protect children and vulnerable groups from hazardous substances added in the baby foods and other milk products. To protect public health, to protect the consumers right, to enforce the law and to maintain and monitor the quality of the products traded it has been long cherished dream for the nation to have a reliable, valid, acceptable testing infrastructure in chemistry. Unfortunately, at present the chemical testing service providers viz, BSTI, BCSIR, BAEC, FIQC, Universities are rather producing test results that are sometime questionable.

3.1 Research Method to Conduct Strategic Analysis

3.1.1 Exploratory Research

Experiencing the non-response to the distributed questionnaire (ANNEXURE-B) (only less than 1.0%) from the 250 industries and the laboratories, we have applied the methodology of the exploratory

research in the elaboration of this strategy upon establishing a three-members study team upon receiving a grant from the Ministry of Science and Information & Communication Technology, GoB under special allocation program. The study team played the leading role in identifying the national needs in the field of chemical metrology, conducting a SWOT analysis of the existing system, listing the priorities for future development and selecting appropriate strategic actions.

In the framework of this process, the industrial end-users, laboratories and certification bodies nation-wide have contributed through answering communications, as well as participating to individual interviews and consultations. The Study Team members participating, conducting, and attending a series of national, regional and international events: meetings, seminars, workshops, conferences, study missions to understand the industrial requirements, to record the exporters' problems, to assess the country status in chemical measurements, instrumentation & calibration service requirements and laboratory management system and accreditation-standards-quality management status.

Under the leadership of ICSL BCSIR, the study team organized the second consultative workshop on 30 June 2009 to present this draft National Strategy for developing the Chemical Metrology Infrastructure of Bangladesh for collecting further invaluable comments, guidance, inputs and supports to improve further before finalizing the Draft for adoption by the Government. On the basis of this experience, such exercise would be highly beneficial to the strategic positioning of Bangladeshi metrological infrastructure.

This national strategy for developing chemical metrology infrastructure of Bangladesh - the 'chemical metrology strategy', in short, is the outcome of thorough investigations, brainstorming, and extensive process of strategic thinking that has included more than one thousands (Chapter 6: Selected Bibliography) national-international studies, investigations to conduct an exploratory research.

On drafting this National Strategy the Study Team from ICSL BCSIR studied metrology, quality and conformity assessment systems of more than 40 countries/economies all over the world, accumulated more than 1000 (one thousand) national-international reports, laws and regulations, scientific literature, publications (Chapter 6: Selected Bibliography), opinions, national-international experts' views, communications with export promotion authorities, chamber and trade associations, recommendations from industry-civil-consumers societies, development partners, UN agencies and private-public stakeholders active in the field of the national and international quality and conformity assessment infrastructure (NQI). The Team had experience in conducting some laboratory based technical analysis to see the overall country condition in terms of providing test results in chemical measurements in the year 2001 and 2003. In the recent past, news media and a number of national meetings have been debating on the test data produced from public and private laboratories in determining the melamine in infant formula and milk powders. This is an example of the lack of any standard metrology.

Summary of an exploratory research has been elaborated and this strategy is the outcome of this study where a brief outline of the strategic goals, objectives and actions with mission and vision have been documented. The external and internal analysis for needs assessment and environmental

analysis has been summarized. Links with the national strategy paper PRSP and the linkage with other institution in metrology BSTI have also been depicted in this draft national strategy paper.



Fig-3.1: Methodology Followed in Developing the Strategy for Chemical Metrology Infrastructure

3.1.2 Laboratory Based Study

In the year 2003 two of the Team Members conducted a comprehensive study on the available bottled water in Bangladeshi market where they confirmed that more than 53% data declared on the product labels are unreliable and invalid or fake.

3.1.3 International Mission Reports from UN Agencies

A large number of international missions from UN agencies confirmed the urgent need of national chemical metrology laboratory to provide the "reference laboratory services" to disseminate the traceability in chemical measurements.

3.1.4 Meeting with Stakeholders in the Industries

Moreover, trade associations, Export Promotion Bureau, FBCCI, DCCI and other industry representing bodies were consulted to assess the national need of this reference and instrumentation calibration laboratory to facilitate the trade. From thorough consultative process exploratory primary research confirmed that ICSL BCSIR may come forward with very unique reference laboratory services in Chemical Measurement in the priority fields : foods, agro-based product and fisheries, pharmaceuticals and environmental area to provide the traceability in measurements for other national laboratories.

3.2 External analysis: Global Requirements

In the globalized marketplace following the creation of the World Trade Organization (WTO), a key challenge facing developing countries is a lack of national capacity to overcome technical barrier to trade (TBT) and to comply with the requirements of WTO agreements on TBT and SPS, which are now basic prerequisites for market access embedded in the global trading system. As a founder member of WTO, during the Uruguay Round, Bangladesh also signed these two important agreements, namely, the agreements on TBT and SPS having serious implications in trade in this Post-MFA era. Confidence building among buyers through reliable and valid testing, conformity assessments considered as one of the major technical barriers to trade. With a view to meeting the challenges related to TBT & SPS, Bangladesh is indeed in urgent need of development of countrywide conformity assessment infrastructure for standards, quality, accreditation, metrology, testing, calibration, inspection and access to the higher education in measurement sciences. Developing technical capacity in calibration (both in physical and chemical) service areas with demonstration of technical competency as per series of international standards, e.g. ISO/IEC 17000 Pack has been assumed as immediate requirements for Bangladesh in order to be an able partner in the global trade regime.

To address the demand for calibrations in the chemical measurements and sciences, to increase the confidence among the buyers in the testing and measurement practices in the country, the overall project objective is to contribute to growth of industrialization and reduction of poverty via supporting trade through providing calibration as well as conformity assessment infrastructure support service at the backward linkage for the development, strengthening and diversification of production and export base of Bangladesh. Thus, these MiC activities would help developing infrastructure in the country so as to help overcoming the Technical Barrier to Trade (TBT) and Sanitary and Phytosanitary (SPS) challenges in trading under WTO regime.

The purpose of this National metrology in chemistry (MiC) strategy is to develop national infrastructure for MiC as an essential part of countrywide conformity assessment infrastructure for accreditation acceptable at the international level for the facilitation of domestic and industrial trade.

It is worthwhile to note that during 2010-2021, the national facilities would be created mostly to provide calibration services in the chemical measurements including: calibration of chemical measuring instruments and calibration & validation of the chemical testing methods. Services would be developed for equipment qualifications (EQ: DQ/IQ/OQ/PQ/PM) and training on laboratory quality management system and analytical instrumentation sciences.

3.2.1 Need for Calibration Laboratory

Measurement is vital in science, industry and commerce. Accuracy and reliability of all measurements would be doubtful if the instrument used were not calibrated. Calibration ensures that a measuring instrument displays an accurate and reliable value of the quantity being measured. Thus, calibration is an essential activity in any measurement process.

3.2.2 Calibration

Calibration is essentially the comparison, under specified condition, with a higher standard, which is traceable to a national or international standard, or an acceptable alternative. Understanding of calibration is not complete without understanding uncertainty and traceability. In the above definition, the known values of the measured refer to a standard. This standard must have a relationship vis-a-vis the calibration.

3.2.3 Traceability

The concept of establishing valid calibration of a measuring standard or instrument by step-by-step comparison with better standards up to an accepted national or international standard. In the last two decades, Bangladesh has experienced huge growth in industrialization. Thousands of industries producing products for domestic as well as export markets are willing to have their GMP/GLP as per national and international standards to secure their market access. Hundreds of industries are now having QMS and EMS Certifications as per ISO9000, EMS14000, HACCP etc. To meet the buyers' requirements, and in accordance with the cGMP, GLP and ISO requirements these QC laboratories MUST have their equipments calibrated time-to-time. Only a few number at present having the calibration services from foreign countries: India, Malaysia, Singapore with facing problems in terms of time and money.

But under WTO regime after 2005 industries are now facing various TBT and SPS barriers in exporting products especially in the area of Quality Control and Quality Assurance. But due to lack of countrywide conformity assessment infrastructure as well as calibration services with appropriate international recognition these industries are facing sever constraints.

To ensure the reliability, accuracy and traceability of measured testing results all these measuring equipments are in need of periodic routine calibration and maintenance.

3.3 Internal analysis

As stated above metrology is the "science of measurements". Chemical metrology is the "science of chemical measurements". Consumers are asking whether the milk or infant formula is containing melamine or not. Regulators and utility suppliers are worried whether the drinking water is containing arsenic or not. Exporters are worried whether importing economy like EU rejects the consignment of the shrimp and fisheries products at the Point of Entry (PoE) upon measuring/detecting the presence of nitrofurans, chloramphenicol (CAP) or malachite green. Bangladeshi jute, leather and tea are gradually losing its global market due to the poor quality. Pharmaceuticals, horticulture-agro-based, light engineering products are struggling to gain the market access and facing the technical barriers to trade and SPS related obstacles raised by the importing economies.

Bangladeshi industries are facing these challenges due to lack of access to the reliable, valid and acceptable test results from the chemical measurements. National laboratories have not yet earned the international recognition through accreditation as per ISO/IEC 17025 and other internationally acceptable means.

Moreover if we consider the clinical diagnostic tests services from more than ten thousand laboratories in health service sectors, billions of taka is spent in chemical measurements. And all these tests are conducted without any knowledge on the quality, acceptance and reliability information.

The envisioned national network of Reference Laboratories i.e. the chemical metrology infrastructure is to practice Research and Development, to disseminate traceability, to understand and realize this QUALITY of these chemical measurements from these thousands of laboratories. By and large, in Bangladesh research and development in metrology- the science of measurements are absent due to lack of national chemical metrology infrastructure.

All the chemical measurements results from the public and private testing laboratories are not yet traceable to the agreed reference standards or Assigned Reference Values (ARV) or SI units. There is a big gap and link missing between the working standards used the routine testing and measurements and the international and or agreed certified reference materials and or standards (Fig-2.1 & Fig-2.2).

The study team members have reported separate studies to depict the status of the national laboratories and the quality of the data generated from these national laboratories. As an example, one study conducted by the authors in 2000-2003 showed that more than 53% data produced by the different laboratories and declared on the commercially available bottled water is invalid. There are several other studies on Bangladeshi laboratories confirmed this poor situation. Only a few multinational laboratories including SGS and Bureau Veritus having accreditations for some limited scopes providing acceptable services in textile testing.

To fulfill the international and national regulatory as well as trade and export requirements from importing markets under WTO agreements all the testing laboratories should have accreditation certification as per international standards ISO/IEC 17025. To meet this requirement with a Gazette Notification the Government of Peoples' Republic of Bangladesh has enacted the Bangladesh Accreditation Law on 16 July 2006 under which Bangladesh Accreditation Board BAB has been established on 03 September 2006.

But without ensuring the availability of traceability to agreed reference standards and or to SI unit and accredited calibration services in chemical measurements, these accreditation of laboratories in Bangladesh will not be possible. Unfortunately in Bangladesh this vital element of Chemical Metrology Infrastructure with appropriate international recognition is completely absent.

This envisioned MiC infrastructure will also contribute to address the other vital conformity assessment infrastructure demand in the area of access to higher education analytical sciences and metrology. In Bangladesh this vital element is also absent because there is no department or institute in the universities or elsewhere to conduct the training on analytical sciences and conformity assessments. The fact is the country can achieve easily a remarkable growth in the GDP by pumping resources in implementing conformity assessment infrastructure and metrology. This *National Strategy for Chemical Metrology* is therefore presenting an overall guidance with a vision 2021.

3.4 What Services from the Partnership Based Decentralized National Chemical Metrology Infrastructure?

Considering the country situation of Bangladesh the main functions to be performed by the envisioned partnership based decentralized national chemical metrology infrastructure are:

- To provide accredited instrumentation calibration services for industrial quality control (QC) equipments, scientific, analytical and measuring equipments (calibration of chemical measurement equipments) with traceability to agreed reference standards, say, CRMs and or other national/ international material standards.
- To disseminate traceability in chemical metrology services (calibration/validation of chemical testing methods): for reliable, valid, accurate and precise testing/calibration results, establishing the unbroken chain of measurements with traceability to agreed reference standards (CRMs) and or to SI units whichever applicable.
- To provide Design Qualification (DQ) services as per international guidelines and norms (from ISO/US FDA, cGMP, GLP, GALP etc.) for all modern scientific and testing equipments in industrial plants, industrial QC and other testing laboratories.
- To provide Equipment Qualifications (EQ): Installation Qualification, Operation Qualification, Performance Qualification (IQ/OQ/PQ) Services.
- To produce, hold and provide certified calibration standards, QC Check Standards, SRM, CRM with assigned and agreed reference values as per ISO/IEC 17034.
- To ensure the periodic national PT/ILC actions in the country on a regular basis as per ISO/IEC 17043.
- To develop training services in MiC, analytical sciences, Laboratory Quality Management Systems and analytical instrumentation and other related areas of measurements.
- To conduct research and development (R&D) in chemical metrology, testing and calibration, analytical sciences, method validation, uncertainty and Laboratory Quality Management System LQMS.
- Ensuring the international recognition in chemical measurements by the Designated National Reference (Calibration) Laboratories through participating regional, international Metrology in Chemistry actions hosted by APMP, CCQM, BIPM.

3.5 SWOT Matrix

Internal	External
Strength	Weakness
<ul style="list-style-type: none"> • A number of multidisciplinary national expert organizations within different line ministries are operational. • Infrastructure and networks available to some extent. • Highly educated human resources available within the existing expert technical organization and system • Specialized and complete chemical measurement areas are covered by these expert organizations • For calibration in physical measurements, BSTI Metrology have established the services with accuracy level at the highest in the nation. • Harmonization of legislation is going on by the GoB • BSTI statutory position is secured by its status as a governmental body. • Accreditation and Consumers Rights Protection Act has given importance of quality aspects • GoB commitment made visible through establishing ICSL BCSIR to be the first national reference laboratory aiming to create Chemical Metrology system • ICSL BCSIR earned wide appreciation. Example established to act as the coordinating reference laboratory to run national Chemical Metrology actions • Draft National Strategy Developed with GoB sponsorship through Ministry of Science and Information & Communication Technology • BSTI and other Expert Institutes expressed commitment to establish Chemical Metrology • Regional and international metrology communities and development partners are providing technical assistance • Support achieved from the different government ministries and trade bodies 	<ul style="list-style-type: none"> • Lack of willingness to build partnership in MiC. • Presence of misconception on MiC, lack of cooperation and transparency within the existing metrology body (BSTI) • No good tradition, experience in physical metrology and technology • No experience in Chemical Metrology • Reluctance to reach to a common vision on developing of the national quality, conformity and metrology system • Incompatibility of institutional and legal framework with the modern international metrology norms and practices • Weaknesses in organizational performance in the existing framework • Lack of leadership and weak administrative capacity leading to a negative external perception • Low level of public awareness on Metrology • Absence of international recognition of calibration certificates • Lack of R & D in metrology • Lack of /or obsolete equipment • Absence of second layer calibration labs in physical measurements • Relatively low salaries and poor motivation in the public sector • Poor funding in science and ICT sector (<0.05% of GDP • Inefficient planning, management and implementation of the annual development project in public technical organization

Internal	External
Opportunity	Threat
<ul style="list-style-type: none"> ■ Government has a clear Vision 2021 to utilize science, innovation for sustainable industrialization ■ Increased demand in quality and entrepreneurial spirit ■ Possibilities of external technical assistance and funding from EU, UNIDO, NORAD, AusAID, SAARC and other development partners ■ Regional and international metrology organizations are willing to support Bangladesh in Chemical Metrology ■ Availability of external know-how ■ Potential to be the south asian regional hub in Chemical Metrology ■ Bilateral and multilateral supports available from NPL India, PTB Germany, NMI Australia, NMI Thailand and other 	<ul style="list-style-type: none"> ■ Resistance to bring the legal framework in SMTQ in line with the international system ■ Non-cooperation from the existing metrology organization (BSTI) to build partnership with other specialized organizations. ■ Lack of willingness to Designate other organizations having relevent background and experience in the particular field in Chemistry ■ Protectionist behavior from BSTI and tendency to bring EVERY measurement field including chemistry under mandatory legal metrology control ■ Non-cooperation among the potential partners in working as reference labs in a coordinated way ■ Insufficient funding to implement the National Strategy ■ Insufficient funding to develop resource in analytical sciences ■ Limited financial support from the industries to invest in R & D infrastructure ■ The private industries are not willing to pay "higher price" for "higher quality testing service" from the public institutes. Cost recovery is uncertain and sustainability is at risk ■ Difficulties to recruit and retain young and skilled staffs with low salary in public sector ■ Slow process of harmonization with international system in metrology ■ Lack of confidence in national human resources and reliance on foreign advisors ■ Political instability and lack of continuity in the development activities ■ Slow response from the Government to the urgent issues in chemical metrology

4.0 STRATEGIC OPTION: DESIGNATED NATIONAL INSTITUTES TO ESTABLISH THE PARTNERSHIP BASED DECENTRALIZED CHEMICAL METROLOGY INFRASTRUCTURE OF BANGLADESH

In chemistry it is almost impossible to get an institute which may excel in performing all measurements for all samples/matrices which are practically infinite in number. Hence the vast majority of chemical metrology functions should be designated to the different specialized and expert organizations of the country under different concerned ministries to cover the wide spectrum of chemical fields and to meet the growing demand of establishing a reliable chemical metrology infrastructure in a possible shortest time by the year 2021. Using resources and expertise available in different organizations would be the most efficient way in this regard without waiting for another hundred (100) years as taken by physical metrology system to growth in other even developed economies.

The Strategic Option is: The Government of Bangladesh (GoB) shall "Designate" different expert and technically competent national institutes in the country to produce, hold, disseminate specific national standards or certified reference materials, to assign reference values (ARV) in their respective field of specialization to perform reference laboratory functions in chemical measurements.

In the metrology literature from BIPM, CCQM, APMP, CIPM MRA these laboratories are often referred to as "Designated Institutes" and they will participate in the regional metrology organization APMP and the highest international metrology program CIPM MRA activities with a similar status of NMI. These designated national reference (calibration) laboratories (DNRL) will collaborate with a lead or coordinating designated National



Fig-4-1: Strategic Plan of Establishing a Partnership based Decentralized Chemical Metrology Infrastructure of Bangladesh (as per APMP, 2009 recommendation)



Fig-4-2: Strategic Plan to Establish Traceability to CRMs through International Collaboration with MiC in Bangladesh

STEPS TOWARDS CHANGE

National Strategy for Accelerated Poverty Reduction II (Revised) FY 2009-11

- Policy Matrix 5** Small & Medium Enterprise Development [NSAPR-II, 2009, page 129]
Strategic Goal 7 Building new technological capacity and ensuring technology upgradation, adaptation and diffusion
Key Target Adapt new technology
- PRSP Policy Agenda (2009-11)** Encourage cooperation and partnership between the universities, business and R&D institutes. Encourage invest on research and development for new product innovation product diversification and technology transfer.
Lead Responsibility BCSIR &
- Policy Matrix 7** Small & Medium Enterprise Development [NSAPR-II, 2009, page 147]
Strategic Goal 2 Easing Supply Constraints
Key Target Facilitate Technology development
PRSP Policy Agenda (2009-11) Prepare a technology development strategy
Lead Responsibility MoSICT

NATIONAL STRATEGY FOR DEVELOPING CHEMICAL METROLOGY INFRASTRUCTURE

- Strategic Goal 1** Partnership based Decentralized National Chemical Metrology Infrastructure established and received international recognition in disseminating traceability in chemical measurements
- Strategic Goal 2** National chemical Measurement capacity improved and measurement results reached acceptable quality

BANGLADESH NATIONAL CHEMICAL METROLOGY INFRASTRUCTURE

Mission

Chemical Metrology Infrastructure of Bangladesh will accumulate all its resources in a coordinated manner in embodying the technically competent and reliable backbone of the national reference (calibration) laboratory functions to disseminate the traceability to the agreed reference standards and or to SI unit for the chemical measurements from the national testing laboratories.

Vision

By the year 2021 Bangladesh will excel in producing results from chemical measurements with acceptable quality through utilizing the partnership based decentralized infrastructure for Metrology in Chemistry to reduce the overall non-conforming data from the national laboratories to less than 30% from its current estimated 50%

Fig-4-3: Link of this National Chemical Metrology Strategy with the National Strategy for Accelerated Poverty Reduction II (Revised) FY 2009-11

Reference Institute of Chemical Metrology (NRCM) to earn CMCs through the key and supplementary comparisons hosted by APMP and BIPM so as to provide the traceability to agreed reference and or SI unit wherever applicable in chemical measurements. As per recommendations from BIPM CCQM, APMP this partnership with the national and international metrology organizations in chemical metrology will help achieving the international recognition in a relatively quicker way and bridging the missing gap existing at present in Bangladesh as well as in other developing economies.

Being the first national centre in public sector with Metrology in Chemistry functions, ICSP of BCSIR may take lead in this regard as such to be the designated National Reference Institute of Chemical Metrology (NRCM) to coordinate all these national reference (calibration) laboratories in chemical metrology through developing a suitable and need based national action plan in priority fields. These designated national reference laboratories should in turn be accredited as per ISO/IEC 17025 as laboratory, ISO/IEC 17034 as CRM producers, ISO/IEC 17043 at PT/ILC providers, ISO/IEC 15195 for Clinical Medicine.

From the global practices it has been observed that except in the field of physical measurements only a few countries operate a centralized metrology organization to implement the national Metrology in Chemistry (MiC) program with one NMI.

To facilitate the Metrology in Chemistry (MiC) program, most of the countries including developing as well as technologically advanced countries (e.g. Finland, Germany, Japan, Australia, Denmark) established the decentralized and or partnership based chemical metrology system with a lead coordinating organization designated to perform the functions of NMI.

Even designated reference laboratories may be from private sectors. Designated laboratories are nominated in accordance with the metrological plan of action for the different subject fields and in accordance with the metrological policy of the country. As the importance of metrology in non-physical areas such as chemistry, medicine and food increases, fewer countries have a single body to be an NMI to cover all Chemical fields. Hence the number of "designated institutes i.e. national reference laboratories" is currently growing rapidly to facilitate the MiC infrastructure.

4.1 Vision and Mission

4.1.1 Vision

By the year 2021 Bangladesh will excel in producing results from chemical measurements with acceptable quality through utilizing the partnership based decentralized infrastructure for Metrology in Chemistry to reduce the overall non-conforming data from the national laboratories to less than 30% from its current estimated 50%.

4.1.2 Mission

Chemical Metrology Infrastructure of Bangladesh will accumulate all its resources in a coordinated manner in embodying the technically competent and reliable backbone of the national reference (calibration) laboratory functions to disseminate the traceability to the agreed reference standards and or to SI unit for the chemical measurements from the national testing laboratories.

4.2 Strategic Goals, Objectives and Actions

4.2.1 Strategic Goal 1

Partnership based Decentralized National Chemical Metrology Infrastructure established and received international recognition in disseminating traceability in chemical measurements

4.2.1.1 Objective 1

Legal approximation and development of a National Strategy in the field of metrology in chemistry. Reviewing and adopting the national legal framework in conformity assessment in line with the international best practices in standards, metrology, testing accreditation etc. to allow the technically competent national institutes to act voluntarily as the reference laboratory service providers in chemistry with accreditation as per applicable international standards and guides. Completion of the process of legal approximation by preparation of secondary legislations or SRO, if required, and enforcement guidelines covering sectorial approaches as regards. Creation of competition and level play ground for the "technically competent actors". Policy should be: *"avoid bringing chemical metrology under a mandatory control to protect monopoly rather create legal environment to allow voluntarily technically competent ones"*.

Legal arrangement to be made for setting up and strengthening the National Reference Institute of Chemical Metrology (NRICM) in ICSL BCSIR to be the coordinating designated institute in MiC action in the country. Appropriate accredited reference service providers may be appointed by the GoB as the "Designated National Reference (Calibration) Laboratory in the specific field(s)".

Actions

- 4.2.1.1.1 Ensured government support and consultancy in legal approximation. Legal arrangement will be in favor of the concept that through the line ministries, based on the accreditation status and expertise, GoB will appoint the Designated National Reference Laboratory in specific fields.
- 4.2.1.1.2 Secured advice on institutional design for Metrology in Chemistry in order to reinforce the metrology service from the concerned institute to be appointed as the Designated National Reference Laboratory in the specified field of chemical measurements.
- 4.2.1.1.3 Development and Review of this National Strategy on MiC and - developing comprehensive action plans to improve traceability in selected areas (setting priorities).
- 4.2.1.1.4 Conducting the comprehensive Survey on Instrumentation Calibration Needs of Bangladesh as per the Developed Questionnaire (ANNEXURE-B).
- 4.2.1.1.5 Development of a National Database of the Laboratories and making available in the public domain via web.
- 4.2.1.1.6 Evaluation of equipment supply, advice on and recommendation for optimization of necessary equipment.
- 4.2.1.1.7 Allocating national budget to implement the ADP projects when Development Project by

the selected national expert institutes through line ministries submitted for developing the reference laboratories in the specified field of chemical measurements. For the year 2010-2021 priority has been identified in food and pharmaceuticals, shrimp and fisheries, water & environment, leather & jute, light engineering products, cement and building materials, clinical biochemistry.

- 4.2.1.1.8 Extending Government full support to ensure faster response when Technical Assistance projects are being implemented by UNIDO and other development agencies in developing National Quality Infrastructure (NQI) and metrology infrastructure.

4.2.1.2 Objective 2

Implementation of the National Strategy for Metrology in Chemistry

Actions

- 4.2.1.2.1 Advice on optimization of staffing, quality of services, and funding of institutions, standard and reference laboratories in charge of traceability chain in metrology in chemistry.
- 4.2.1.2.2 Support and facilitate application of quality systems in selected laboratories as per applicable international standards and guides e.g. ISO/IEC 17025, ISO/IEC 17034, ISO/IEC 17043, ISO/IEC 15195, ISO/IEC 15189, GLP, CITAC/EURACHEM Guide
- 4.2.1.2.3 Development of concept of establishment of traceability of measurements and determination of measurement uncertainty ranges in selected areas
- 4.2.1.2.4 Establishment of proficiency testing (PT) schemes and preparation and implementation of plans of permanent and periodically interlaboratory comparison (ILC).
- 4.2.1.2.5 Advice on the need of certified reference materials (CRMs) and possibilities for their domestic production. For the year 2010-2021 priority has been identified in food and pharmaceuticals, shrimp and fisheries, leather & jute, light engineering products, cement and building materials, clinical biochemistry.
- 4.2.1.2.6 Facilitation of training and field trips for the staffs of the reference laboratories and staff training abroad (study tours to the partner national and international institutes involved in the project activities such as NPL India, PTB Germany, NMT Thailand, ITI Sri Lanka etc).
- 4.2.1.2.7 Evaluation of equipment, staff, and laboratory premises potential network partners, advice and recommendation for further sustainable allocation in the prioritized fields.

4.2.1.3 Objective 3

Strengthened co-operation and communication between all relevant public and private actors

Actions

- 4.2.1.3.1 Advice on improving the co-operation and communication between public administration, market surveillance institutions, research institutions, laboratories, and companies

- 4.2.1.3.2 Information and training on co-operation and communication in Bangladesh of staff of research institutions, private and public laboratories, and responsible public institutions
- 4.2.1.3.3 Development and implementation of study modules and course curricula for university and vocational training institutes to create competent human resources in analytical sciences, laboratory quality management system and Metrology in Chemistry. Establishment of international collaboration with, say, European TrainMIC and other universities.
- 4.2.1.3.4 Information to stakeholders and experts in the legislative process and information to the public through holding awareness workshop, opening and final conference, web based database and information dissemination.

4.2.1.4 Objective 4

Effective Partnership based decentralized infrastructure for Metrology in Chemistry is established. Establish effective and appropriate partnership among foreign National Metrology Institutes (NMIs) and Bangladeshi Designated National Reference Laboratories (DNRL) in Chemical Measurements via coordinating designated National Reference Institute of Chemical Metrology (NRICM) in ICSL BCSIR.

Actions

- 4.2.1.4.1 Establishing working relationship and participating regional and international MIC activities with APMP, BIPM, SIM etc. GoB may setup one coordinating designated National Reference Institute of Chemical Metrology (NRICM) in ICSL BCSIR who will initiate communications with APMP, BIPM, BIPM CCQM, SIM etc. and act as the counterpart in Bangladesh in these regional and international Chemical Metrology fora.
- 4.2.1.4.2 Establish bilateral partnership with foreign National Metrology Institutes NMIs (NPL India, PTB Germany, IRMM Belgium, BAM Germany, NPL UK, NIMT Thailand, KRISSE Korea, ITI Sri Lanka, NMI Australia, NMI Japan and other Reference Laboratories involved in Metrology in Chemistry activities. Coordinating designated National Reference Institute of Chemical Metrology (NRICM) in ICSL BCSIR may be appointed to framing the action plans through signing Memorandum of Understanding (MoU) and other instruments and to bring all other Designated National Reference Laboratories within this collaborative framework and international cooperation effectively.
- 4.2.1.4.3 Through a coordinating designated National Reference Institute of Chemical Metrology (NRICM) in ICSL BCSIR, all other Designated National Reference Laboratories will establish working relationship with each other and international partners in developing CRMs, Assigning Reference Values (ARVs), participating PT/ILC, Key/Pilot/Supplementary Comparisons.
- 4.2.1.4.4 Establish working relationship among all national-international partners in developing and validating analytical methods, collaborative trials, transferring knowledge through mentoring and training actions.

4.2.2 Strategic Goal 2

National chemical Measurement capacity improved and measurement results reached acceptable quality

4.2.2.1 Objective 5

Need based accredited laboratories developed to provide reliable and valid analytical results from chemical measurements

Actions

- 4.2.2.1.1 Conducting the comprehensive Survey on Chemical Analysis & Measurements: The Needs of Bangladesh as per the Developed TOR and Questionnaire (ANNEXURE-A).
- 4.2.2.1.2 Developing planed and comprehensive need based action programe and allocate sufficient resources to improve the existing national laboratories (ANNEXURE-F) for accreditation in the priority fields so that the chemical measurements services with recognized and acceptable quality made available to the potential clients.
- 4.2.2.1.3 Promotion to up accredited laboratories for chemical measurements through Public Private Partnership. This will increase technical capacity in chemical measurements to meet the growing measurement demands.

4.3 Target Priority Fields in Chemistry & Designated National Reference Laboratories (DNRL) to be established in The Period (2009 -2021)

For this First Strategy Period 2009 - 2021 following seven (07) fields in chemistry have been identified considering the national needs, priority, capacity and availability of the national resources. It has been assumed that concerned institutes through their line ministries will initiate the actions to forward the requests for funding to the viable project proposals (ADPs/TAPPs) prepared with appropriate sustainability plan/business plan formulated after needs assessment survey conducted as per the questionnaire put in the ANNEXURE-A.

Upon assessing the suitability of the project proposals Bangladesh Government will approve Annual Development Project (ADPs) and or Technical Assistance Projects (TAPs) and will take necessary actions to allocate national resources, seek technical assistances and grants, if required, from international development partners to ensure the sustainable transfer of technology via monitoring the Key Performance Indicators (KPIs) [Section 4.6, Box 4-2] of the concerned institutions/potential candidates that are likely to be the Designated National Reference Laboratories (DNRLs).

- 4.3.1.1 **Priority Field 1 Food & Pharmaceuticals:** Nation's first priority is to establish traceability to CRMs in foods and pharmaceuticals. The need for ensuring availability of matrix matched CRMs of foods- drinks-beverages, agro based products has been identified.

Frozen foods, shrimp and fisheries products of Bangladesh are earning the second highest foreign currency through export. To save the rights and safety of the domestic as well as the international consumers and to ensure the export diversification it is essential to add more values to other agro-based and food products via improving the quality. Measuring the presence of toxic substances, heavy metals, organic pollutants, pesticide residues, pathogens, unwanted colors and additives in foods, drinks and beverages are the main challenges to be addressed.

Availability of reliable chemical measurements with traceability acceptable to CRMs, regular PT/ILC for facilitating accreditation is a major stumbling block and technical barrier to trade. It is mandatory to have reliable chemical measurement system to make the pathway into the developed markets for Bangladeshi pharmaceutical. In pharmaceuticals industries chemical measurements are conducted for qualifying and quantifying the Active Pharmaceutical Ingredients (APIs), excipient materials/molecules, packaging materials etc.

Needs for reliable chemical measurements are also critical in running toxicological studies, clinical trials, bioequivalence studies etc.

It has primarily been estimated that more than 97% of the active pharmaceutical ingredients (APIs) and other molecules to be total of at least 400 are being imported and mostly tested outside the border for certification purposes before entering into the country. These imported molecules are used to produce more than 1000 presentations in different dosage forms: capsule, suspension, syrup, tablets, injection, suppository and inhaler etc.

More than 239 pharmaceuticals are operating their in-house QC labs varying in sizes from small, medium to big. To meet the cGMP and GLP requirements it is essential to ensure the supply of CRMs, RMs to have the nationwide periodic and regular PT/ILC activities to provide traceability in chemical measurements being conducted inside these pharmaceutical QC laboratories.

- 4.3.1.2 Priority Field 1 Potential Candidate to be the Designated National Reference Laboratory in Food & Pharma:** Instrumentation & Calibration Service Laboratory (ICSL), BCSIR, Ministry of Science & ICT (MoSICT). Government is already (2008-2012) implementing the country's first reference laboratories in food and pharmaceuticals which will in turn be "Designated National Reference Laboratory (DNRL)" in this specific field of chemistry. In collaboration with other national and international "reference laboratories" ICSL will assign reference values (ARVs), will produce and disseminate CRMs, coordinate/organize PT/ILC, develop and validate analytical methods, provide instrumentation calibration services in chemistry and conduct training, R&D in MIC. To earn the status of DNRL ICSL would be receiving accreditation as per ISO/IEC 17025, ISO/IEC 17034, ISO/IEC 17043 and other applicable standards.

4.3.2.1 Priority Field 2 Textile, Jute and Leather: Bangladesh export economy is heavily dependent on textile, jute and leather covering almost 75% of the total export earnings. Unfortunately 98% of testing services (physical and chemical) in readymade garments and textile are provided by the multinationals: SGS, Bureau Veritas (BVQ), Intertek Testing Services Ltd. (ITSL) to meet the manufacturers and buyers testing needs/requirements.

Only a few national private testing labs are operating within the manufacturers for their in-house QC applications. BSTI also operate one textile testing lab with a very limited capacity/scope in physical measurements and without accreditation. No chemical measurement for textile is available from BSTI.

In the leather sector Bangladesh College of Leather Technology (BCLT) provides the major testing services (both physical and chemical) and only recently earned accreditation in testing only for 04 (four) physical parameters. No chemical measurements from BCLT has received accreditation yet.

Bangladesh Jute Research Institute (BJRI) conducts the research in jute. There is no commercial service available until to date. BCSIR under the Ministry of Science and Information & Communication Technology established the Fiber and Polymer Research Division (FPRD) mainly for R&D in textile, jute and polymer with a limited capacity to provide commercial testing. However, the Ministry of Science and ICT has established the nation's biggest Institute of Leather Science & Technology in BCSIR with advance facilities for testing both physical and chemical measurements. GoB may take initiative to establish the accredited designated national reference laboratory in leather and textile in BCSIR.

4.3.2.2 Priority Filed 2 Potential Candidate to be the Designated National Reference Laboratory in Textile, Jute and Leather: Institute of Leather Science and Technology (ILST), BCSIR, Ministry of Science & ICT (MoSICT). As BCSIR has sufficient experience in R&D, expert manpower, sophisticated equipment and plenty of physical space/facilities within an independent campus in Nayarhat, Savar Government may take initiative to establish the National Reference laboratory in Textile, Jute and Leather in BCSIR under the aegis of the Ministry of Science and ICT. To act as the Designated National Reference Laboratory, this Institute of Leather Science and Technology (ILST), BCSIR would be accredited as per the applicable international standards

4.3.3.1 Priority Field 3 Water & Environment: Due to the massive growth in industrialization in the last two decades as well as ever increasing anthropogenic interventions, natural environment and ecosystem of Bangladesh is severely under threat. Presence of arsenic and other heavy metals in the drinking water put the country's huge population in a century's one of the biggest natural calamities.

Uncontrolled usage of pesticides and fertilizer to produce more foods for the overpopulated country, uncontrolled growth of brick fields to burn trees and rubber, sulfur contaminated coals, uncontrolled release of effluents from leather, textile dying,

chemical and pharmaceuticals industries made this country to be a "environmentally hot spot". As such reliable measurement of the presence of pollutants in soil, air and water is a challenging task lying ahead of the analytical scientists' community of Bangladesh.

4.3.3.2 Priority Field 3 Potential Candidate to be the Designated National Reference Laboratory in Water & Environment: Department of Public Health Engineering Central Laboratory (DPHE CL), Ministry of Local Government & Engineering and Rural Development & Co-operative (MoLGERDC). DPHE Central Lab at Mohakhali Dhaka has been entrusted to perform as the central reference laboratory to control more than 18 Regional Labs of DPHE to monitor the drinking water quality. This laboratory is neither yet accredited nor yet ready to conduct R&D in this important field. With its excellent controlled environment, physical facilities and instrumentation capacity to test more than 40 physico-chemical parameters in drinking water this DPHE Central Laboratory may be a potential candidate to be the Designated National Reference Laboratory in Water Testing.

4.3.4.1 Priority Field 4 Ceramics & Building Materials: Being the single sector contributor to Bangladesh National GDP, construction and housing is the biggest one (more than 07% of GDP). Bangladesh is one of the largest ceramic goods exporting countries captured global markets.

Only recently it has been envisioned that Bangladesh has a great potential to export glasses upon fulfilling the national demand. In India Bangladesh is already exporting a huge volume of cement every year and struggling to capture more market share in India with ongoing debates in quality and certifications.

And very recently from August 2009 Bangladesh is starting shipping bricks of BD Tk 400 crore (~57 million USD) to Tripura, the north-eastern province of India with an estimated potential market of 300 million USD in the next five years.

Needs of acceptable and reliable physico-chemical measurements are critical in this field of high demand. Presently with their limited capacities BSTI, BUET and other public and private engineering universities and polytechnic/vocational educational institutes are providing the services in building materials, glass ceramic testing without traceability in measurements. There is not a single laboratory yet accredited. Accredited calibration laboratories are also to be established to support these laboratories. For R&D Applications in these fields Institute of Glass & Ceramic Research & Testing (IGCRT), BCSIR have acquired a wide range of sophisticated instrumentation and having a large number of qualified manpower located inside the spacious BCSIR campus.

4.3.4.2 Priority Field 4 Potential Candidate to be the Designated Reference Laboratory in Ceramics & Building Materials: Institute of Glass & Ceramic Research & Testing (IGCRT), BCSIR, Ministry of Science & ICT (MoSICT) may come forward to have this public organization upgraded further to be the Designated National Reference Laboratory in Glass Ceramic and Building Materials.

4.3.5.1 Priority Field 5 Nuclear Chemistry: Bangladesh Atomic Energy Commission (BAEC), Ministry of Science and ICT is the main national organization involved in R&D activities in nuclear and atomic sciences. BAEC also have the country's only research reactor MARK TRIGA II to produce isotopes and nuclear chemicals to be used in health and agricultural applications. In close collaboration and cooperation with IAEA, BAEC is responsible for production, characterization, storage and dissemination of radioactive chemicals produced from the Atomic Energy Research Establishment (AERE) in Savar. Bangladesh has signed the nuclear non-proliferation treaty and committed to apply the knowledge of nuclear science and chemistry for peaceful use. Ministry of Science and ICT, Government is already implementing one Secondary Reference Laboratory of Radiation Dosimetry but this laboratory needs to be accredited as per ISO/IEC 17025. Traceability in measurements in nuclear chemistry has not yet been established fully in BAEC.

4.3.5.2 Priority Field 5 Potential Candidate to be the Designated Reference Laboratory in Nuclear Chemistry: Atomic Energy Research Establishment (AERE), BAEC, Ministry of Science & ICT (MoSICT). There is a great potential to establish the "primary reference laboratory" to produce CRMs applying Induced Neutron Activation Analysis technique utilizing the TRIGA- MARK II Research Reactor facility available at AERE, Savar, Bangladesh Atomic Energy Commission. GoB may come forward to setup the INAA system there in AERE. If designated this national reference laboratory may provide the CRMs with highest national accuracy in chemical measurements utilizing the primary method (INAA) for the measurements of trace elements in various matrixes.

4.3.6.1 Priority Field 6 Gas Measurements: It is critical to maintain and assessing the quality and purity of the gases: oxygen, hydrogen, helium, nitrogen, argon, acetylene used in hospitals, food and pharmaceutical and chemical industries, laboratories, universities to be fit-for-the-intended purposes.

In Bangladesh these gases are mostly supplied by Bangladesh Oxygen Limited (BOL) the subsidiary of British Oxygen having almost 100% market share. Millions of liters of gases are being consumed daily. Quality aspect is not yet known to the consumers and users of these gases. And it is generally not known whether the levels of the contaminants like: COx, moisture and Hydrocarbons and other toxic substances are within the acceptable limits or not.

GoB has not yet taken any regulatory and or conformity assessment measures to assess monitor and control the gas based products used to treat, say, patients and producing pharmaceuticals having vital health implications. Moreover, thousands of hospitals, thousands of clinical diagnostics laboratories and testing laboratories are using these gases without knowing the quality at all.

4.3.6.2 Priority Field 6 Potential Candidate to be the Designated Reference Laboratory in Gas Measurements: Metrology Wing, BSTI, Ministry of Industries (Mol). The critical part to produce the CRMs for gas measurements is that it is essential to apply the gravimetric technique to measure the various components of gases within the gas reference standards.

The gravimetric measurement should have the traceability from the national mass metrology laboratory. By implementing EU funded Bangladesh Quality Support Programme (BQSP), GoB received the technical assistance from UNIDO to set up the mass metrology laboratory within BSTI, Ministry of Industries, to achieve the highest national level accuracy in mass measurements up to nano-gram. Therefore it has been envisioned that Ministry of Industries, GoB through BSTI Metrology Lab may take initiative to setup a programme to produce gas calibration standards and CRMs to provide traceability from BSTI metrology laboratory. BSTI Metrology would be performing the function of the Designated National Reference Laboratory in Gas Measurements. This will help implement a national conformity assessment and quality control and monitoring of gases produced and consumed in the country.

- 4.3.7.1 **Priority Field 7: Clinical Biochemistry:** In Bangladesh with nearly 150 million people, ten thousands clinical diagnostic laboratories, hospitals, clinics (both public and private sectors) are in operation to provide measurements of more than 100 bio-chemical, clinical pathological, microbiological parameters. Blood, urine, and other biological samples are being analyzed everyday for the patient management with little valid information about the quality and traceability, reliability of the test results produced.

To monitor, control the quality of these clinical diagnostic laboratories neither there is any National Reference Laboratory nor there is any nation wide proficiency testing and or inter-laboratory comparison activities. Attaining traceability in clinical bio-chemistry to any CRM is of still a challenging scientific task to the global analytical science communities. Running well-planned inter-laboratory comparison (ILC) and round robin programs are the plausible solution applied to assess, monitor and control the quality of the data produced from the clinical testing laboratories. Along with ISO/IEC 15189, ISO 15195 is the international standard for setting up the reference laboratories in clinical medicine.

- 4.3.7.2 **Priority Field 7 Potential Candidate to be the Designated Reference Laboratory in Clinical Bio-chemistry:** ICDDR,B, BIRDEM, BSMMU, IPH, Ministry of Health & Family Planning (MoHFP) & Ministry of Education (MoEd). To cover the wide range of services and huge demand in Bangladesh it has been envisioned that a number of partnership based well coordinated Designated National Reference Laboratories should be established in Clinical Bio-chemistries having specialized technical competencies in their respective fields. GoB may consider the following institutions to be upgraded further to work as the Designated Reference Laboratories ICDDR,B, BIRDEM, BSMMU, IPH, MoHFP etc. to be accredited as per the applicable international standards ISO/IEC 15189, ISO/IEC 15195, ISO/IEC 17043 etc.

Box- 4.1: Priority Fieldwise Partnership Based Decentralized National Infrastructure for Metrology in Chemistry

Priority Field ID (PF)	Priority Field	National Institution	Role in MiC	Ministries
PF 1	Food, Agro-based, Fisheries & Pharma	ICSL BCSIR	NRICM*	MoS&ICT
PF 2	Textile Jute & Leather	ILST BCSIR	DNRL**	MoS&ICT
PF 3	Water & Environment	DPHE Central Lab	DNRL	MoLGERD
PF4	Ceramic Glass & Building Materials	IGCRT BCSIR	DNRL	MoS&ICT
PF 5	Nuclear Chemistry	AERE BAEC	DNRL	MoS&ICT
PF 6	Gas Measurement	Metrology Wing BSTI	DNRL	Mol
PF 7	Clinical Biochemistry	ICDDR, B BIRDEM BSMMU IPH	DNRL DNRL DNRL DNRL	MoHFP MoEd UGC MoEd MoHFP

* NRICM Coordinating designated National Reference Institute of Chemical Metrology

** DNRL Designated National Reference Laboratory

MoS&ICT Ministry of Science and Information & Communication Technology

Mol Ministry of Industries

MoLGERDC Ministry of Local Government, Engineering and Rural Development & Co-operative

MoHFP Ministry of Health and Family Planning

MoEd Ministry of Education

AERE Atomic Energy Research Establishment

BAEC Bangladesh Atomic Energy Commission

BCSIR Bangladesh Council of Scientific & Industrial Research

BIRDEM Diabetic Research Institute

DPHE Department of Public Health Engineering

ICDDR,B International Centre for Diarrheal Diseases Research, Bangladesh

ICSL Instrumentation & Calibration Service Laboratory BCSIR

IGCRT Institute of Glass & Ceramic Research & Testing

IPH Institute of Public Health

UGC University Grants Commission

5.0 MONITORING & EVALUATION (M&E)

5.0.1 Key Success Factors (KSFs):

During the implementation process of this National Strategy it is essential to monitor the progress of this strategy applying the objectively verifiable indicators (OVIs) arranged within a suitable logical framework. Prior to this it is also imperative to be aware of the fact that the success of this strategy would be dependent on some Key Success Factors (KSFs) shown in Box-5-1. These should be considered as the pre-conditions to have a successful national chemical metrology infrastructure developed within the stipulated time. Failure to recognize the needs of meeting these requirements ultimately will bring failure to the national infrastructure.

Box-5.1: Monitoring & Evaluation: Key Success Factors (KSFs)

KSF 1	Metrology Services Launched with Recognized Quality	<ul style="list-style-type: none">▪ Acceptable recognized products meeting international standards▪ Designing and developing the Metrology Services to meet the customer requirements as well as acceptable international standards from ISO/IEC and others.▪ Defining the appropriate User Required Specifications (URS) of the products.▪ Translating users' demands into Service Package so as to providing solutions to their years-old problems in chemical measurements
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KSF 2	Approved and Recognized Facilities	<ul style="list-style-type: none"> ■ Establishing the reference laboratory system as per applicable international standards and customers as well as regulatory demands. ■ Timely and planned allocation of resources: financial and human both and adopting the required technologies, ■ creating the controlled laboratory environment: civil, electrical and indoor air handling systems, developing the laboratory facilities and ■ deploying the applicable state-of-the-art Laboratory Quality Management System as per international best practices.
KSF 3	Effective Integrated Marketing Communication Program (IMCP): Mainly Public Relations (PR)	<ul style="list-style-type: none"> ■ Efficient placement of the products among the customers mind so as to designing and implementing suitable IMC Programme through Effective Public Relations and Visibility Actions (PR). ■ Participation to national and international PR Events, ■ Sending members to national and international technical and non-technical fora / committees as such contributing to public affairs, ■ publications (both internal and external), ■ website hosting, ■ attending; organizing; co-organizing; sponsoring PR Events: seminar; training; workshop; symposium etc. ■ Press and media relations to cover DNRL Events,
KSF 4	Strategic Pricing based on the appropriate sustainability assessment	<ul style="list-style-type: none"> ■ Being the national public institution pricing should be strategically sufficient to ensure that the organisation is funded adequately enough to fulfil its mission

5.0.2 Key Performance Indicators (KPIs):

Throughout the whole life cycle of the MIC Infrastructure of Bangladesh all the Designated National Reference Laboratories would be monitored, ranked (in terms of achieved scores) by the competent Ministry based on the Key Performance Indicators (KPIs) (Box-5.2) on the yearly basis. To implement this National Strategy at the development stage of the project proposal (ADP or TAP) each proponent institute listed earlier in section 4.3 would be conducting the Needs Assessment Survey with respect to the scopes of their respective field using the needs assessment survey questionnaire (ANNEXURE-A). As mentioned earlier in section 4.3 these potential proponent DNRLs would be developing their long term strategy as well as medium term business plan and would be monitored with respect to KPIs.

Box-5.2: Monitoring & Evaluation : Key Performance Indicators (KPIs)

Key Success Factory (KSF)	Key Performance Indicators (KPI)	Indicator	Target (T)	Actual (A)	Weight (W)	Intermediale Score $=(A*100)/T$	Final Score $S=4*(0 W/100)$	
1. DNRL Products Key Success Factors (KSFs)	Products Branding & Packaging Key Performance Indicator (KPI)							
1. Products Package Launched with Recognized Quality: Acceptable recognized products meeting international standards to create brand image of the services per excellence. Designing and developing the DNRL Product package and branding them to meet the customer requirements as well as acceptable international standards from ISO/IEC and others. Defining the appropriate User Required Specifications (URS) of the products. Translating customers' demands into Standard Branded Products Packaged so as to providing solutions to their yeras-old problems in chemical measurements.	1.1. Number of Brands and Product Packages Lunched	1.1 NBLP			10			
	1.2. Number of Brands and Product Packages Planned	1.2 NBPP			10			
	1.3. Number of Accredited Matrix-matched Certified Reference Materials produced as per ISO/IEC Guide 34	1.3 NCRM			12			
	1.4. Number of Accredited PT/ILC Organized as per ISO/IEC Guide 43	1.4 NPTILC			12			
	1.5. Number of Assigning Reference Values (ARV) done to disseminate traceability for measurements in chemistry	1.5 NARV			12			
	1.6. Number of Method Developed Valiclated and Transferred and Contract Research Services for internal and external customers	1.6 NCRS			10			
	1.7. Number of Equipment Qualifications EQ: IQOQPQ Services Provided	1.7 NEQ			08			
	1.9. Number of External Participants Received Training	1.9 NExTrainee			08			
	1.10. Number of In-house Training Organized for DNRL Personnel	1.10 NinTrain			10			
	[SC1] Sub-Total Final Score [0-4 Scale]							
[4: Excellence 3: Very Good 2: Average 1: Below Average 0: Poor]								

5.1 Expected Strategic Services from the National MiC Infrastructure:

With appropriate leadership from the ICSL (NRICM) along with other partner organizations (DNRLs) the envisioned Partnership Based Decentralized MiC Infrastructure of Bangladesh will provide the following eight (08) packages of services to the nation in chemistry:

- 1. Method Validation Services:** Develop traceable chemical metrology services (calibration/validation of chemical testing methods) for reliable, valid, accurate and precise testing/calibration results so as to establish the unbroken chain of measurements with traceability to agreed reference standards in chemistry.

Box-5.2: Monitoring & Evaluation : Key Performance Indicators (KPIs) (Contd.)

2. Facility Strategic Key Success Factors KSFs	Facility Strategic Key Performance Indicators (KPIs)	Indicator	Target (T)	Actual (A)	Weight (W)	Intermediate Score $I=(A*100/T)$	Final Score $S=4*I/W/100$
<p>2. Approved and Recognized Facilities: Establishing the laboratory system as per applicable international standards and customers as well as regulatory demands. Timely and planned allocation of resources: financial and human both and adopting the required technologies, creating the controlled laboratory environment: civil, electrical and indoor air handling systems, developing the laboratory facilities and deploying the applicable state-of-the-art Laboratory Quality Management System as per international best practices.</p>	2.1. Number of scopes received accreditation for instrumentation calibration services as per ISO/IEC	2.1 NSAICS			35		
	2.2. Ranking achieved with respect to Z-Scores and Number of Participation to Regional Supplementary and or International Key Comparison to Receive Certificates of Measurement Capability (CMCs) to provide traceability to the laboratory in chemical measurements.	2.2 NRCMCs			35		
	2.3. Number of national & international grants and awards received and or nominations to DNRL (NAwards)	2.3 NAwards			30		
	<p>[S2] Sub-Total Final Score [0-4 Scale] [4: Excellence 3: Very Good 2: Average 1: Below Average 0: Poor]</p>						

- Design Qualification (DQ) Services:** As per international guidelines and norms (from ISO/US FDA, cGMP, GLP, GALP etc.) for all modern scientific and testing equipments in industrial plants, industrial QC labs and testing laboratories.
- Assigning Reference Values to Matrix Matched CRMs:** As per ISO/IEC 17034 producing and disseminating matrix matched CRMs in the selected fields priority basis.
- Providing Reference Laboratory Services in hosting organizing PT/ILC:** Act as an accredited PT/ILC service Provider as per ISO/IEC 17043.
- Providing Calibration Services:** Accredited instrumentation calibration services for industrial quality control (QC) equipments, scientific, analytical and measuring equipments (calibration of chemical measurement equipments) with traceability to agreed reference standards CRMs and or SI Unit. Example: ICSL may perform as the Coordinating Designated National Reference Laboratories (CDNRL).
- Providing Equipment Qualifications (EQ) Services:** Installation Qualification, Operational Qualification, Performance Qualification (IQ/OQ/PQ) Services.

7. **Providing Training and Consultancy Services:** In Measurement Science Laboratory Quality Management Systems and Analytical Instrumentation as per ISO/IEC 17025 and other.
8. **Conducting Research & Development (R&D):** In Metrology in Chemistry (MIC), testing and calibration, analytical sciences and Laboratory Quality Management System (LQMS).

Box-S.2: Monitoring & Evaluation : Key Performance Indicators (KPIs) (Contd.)

3. DNRL IMC Key Success Factors	DNRL IMC Key Performance Indicators (KPIs)	Indicator	Target (T)	Actual (A)	Weight (W)	Intermediate Score $=(A * 10) / T$	Final Score $S = 4 * (100 W / 100)$
3. Effective IMCP: Efficient placement of the products among the customers mind so as to designing and implementing suitable IMC Programme through Effective Public Relations and Visibility Actions (PR). Participation to national and international PR Events, Sending members to national and international technical and non-technical fora / committees as such contributing to public affairs, publications (both internal and external), website hosting, attending; organizing; co-organizing; sponsoring PR Events: seminar; training; workshop; symposium etc., Press and media relations to cover DNRL Events, Industries-academia interactions and educational activities, visibility actions through sponsoring other technical events in chemical metrology. Creating and disseminating documentary video on the laboratory activities in CD through personal selling and web.	3.1. Number of publications, technical reports/articles generated, published/accepted in the technical journals	3.1 NReportPub			20		
	3.2. Number of the press & media (both print and electronic) coverage appeared on DNRL events and activities	3.2 NMedia			20		
	3.3. Number of participation and sending members form DNRL to different national committees and public affairs to contribute.	3.3 APubAff			10		
	3.4. Number of PR Events: training, seminar, workshop, symposium, meeting, discussion forum etc. organized, co-organized, sponsored, co-sponsored by DNRL	3.4 NPRSpons			10		
	3.5. Number of Public Relation Events & Study Tours Attended by DNRL personnel	3.5 NPREvents			08		
	3.6. Number of Industry-Academia Interaction Activities Lunched	3.6 NINdAcad			08		
	3.7. Number of External Visitors Stepped into DNRL	3.7 NVisits			12		
	3.8. Number of Enquiry about the Test and Calibration Services both web based and other means	3.8 NEnq			12		
	[SC3] Sub-Total Final Score [0-4 Scale] [4: Excellence 3: Very Good 2: Average 1: Below Average 0: Poor]						

Box-5.2: Monitoring & Evaluation : Key Performance Indicators (KPIs) (Contd.)

4. DNRL Pricing Strategic Key Success Factor	Pricing Strategic Key Performance Indicators (KPIs)	Indicator	Target (T)	Actual (A)	Weight (W)	Interim Score $I=(A*100)/T$	Final Score $S=I*100/W/100$
4. Strategic Pricing based on the appropriate sustainability assessment: Being the national public institution pricing should be strategically sufficient to ensure that the organisation is funded adequately enough to fulfil its mission	4.1. Number of Chemical Testing & Instrumentation Calibration Services provided	4.1 NTestCal			25		
	4.2. Sales and Revenue Earning within a period	4.2 SRevenue			25		
	4.3 Cost of Doing Business within a period (CoDB): Fixed Cost (FC) & Variable Cost (VC)	4.3 CoDB			25		
	4.4. R&D Budget (RD Budget): RDBudget Vs SRev	4.4 RDBudget			25		
[SC4] Sub-Total Final Score [0-4 Scale] [4: Excellence 3: Very Good 2: Average 1: Below Average 0: Poor]							
Sub- Total Score SC1		SC1	4.0	3.28	30		FSC1
Sub- Total Score SC2		SC2	4.0	3.40	30		FSC2
Sub- Total Score SC3		SC3	4.0	2.90	20		FSC3
Sub- Total Score SC4		SC4	4.0	2.00	20		FSC4
Grand Total Score GSC = [FSC1+FSC2+FSC3+FSC4] [4: Excellence 3: Very Good 2: Average 1: Below Average 0: Poor]							

5.2 Conclusion

With a stated mission and vision to reduce the non-conforming data to less than 30% by the year 2021 from its current estimated 50% a sound strategy for developing a partnership based decentralized national chemical metrology infrastructure is discussed here with definite strategy goals, objectives and actions in seven (07) selected priority fields.

This strategy also defined the actions required to improve the national technical capacity in chemical measurements with acceptable quality via promoting accreditation. The distributed metrology infrastructure will bring the expert organizations that are voluntarily willing to act as the National Reference (Calibration) Laboratories in the specific fields to disseminate measurement traceability to the testing laboratories in chemical measurements. Based on the applicable international norms and guides, proven competency via accreditation, GoB may appoint these specialized laboratories as the Designated National Reference (Calibration) Laboratories (DNRL) in the specific fields of chemistry so that they can act as the holder and disseminators of the traceability to the agreed reference standards (CRMs) and or SI unit.

For the period 2010-2021 priority areas have been identified: food & pharmaceuticals, shrimp & fisheries, leather & jute, light engineering products, ceramics & building materials, clinical biochemistry, medical gas. To lead the Metrology in Chemistry program in the country, GoB may appoint ICSL BCSIR as the coordinating designated National Reference Institute of Chemical Metrology (NRICM) which has already initiated its activities in food and pharmaceuticals. ICSL has already taken a leadership in drafting this National Strategy for Chemical Metrology.

In addition to its reference laboratory functions, ICSL as the NRICM should devote a large part of its resources to cross-sectoral knowledge transfer, to advice and coordination. This can be achieved by participating in teaching/training, by supporting the accreditation, by being involved in advising governmental bodies in authorization of laboratories and by assisting in the implementation of legislation. This distributed system requires an efficient communication tool between: the regional and international metrology communities e.g. APMP, CCQM, BIPM etc., the other designated national reference standard holders and the end users the testing laboratories.

If prepared and technical arrangement is developed with competency to run the chemical metrology action, in a particular and carefully selected case, the BSTI Metrology Wing itself can and should act as national reference standard holder in the field of Gas Metrology to provide the traceability in measuring and medical gas quality and mixtures.

All these sector specific designated national reference laboratories would ultimately be coordinated by the National Reference Institute of Chemical Metrology (NRICM) at the highest level in the country to provide the metrological traceability and comparability with the agreed international reference and or definition of units with CIPM Mutual Recognition (CIPM MRA). Appropriate national policy adoption, legal approximation and resource allocation for implementation of this National Strategy is absolutely critical and urgent to keep pace with the international development.

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161. Marine Fisheries Ordinance, 1983, Government of Bangladesh, 1983.
162. Marine Fisheries Rules, 1983, Government of Bangladesh, 1983.
163. Fish & Fish Products (Inspection & Quality Control Ordinance, 1983, Government of Bangladesh, 1983.

164. Fish Feed and Animal Feed Act, 2010, Government of Bangladesh, 2010.
165. Fish Hatchery Act, 2010, Government of Bangladesh, 2010.
166. The Bangladesh Standards and Testing Institution Ordinance, 1985 (has been amended as BSTI (amendment) Act, 2003), Government of Bangladesh, 2003.
167. The Pesticide Rules, 1985, Government of Bangladesh, 1985.
168. Agricultural Product Market (Revised) Act, 1985, Government of Bangladesh, 1985.
169. The Essential Commodity Act, 1990, Government of Bangladesh, 1990.
170. Fish Protection & Conservation (Amendment) Act, 1995, Government of Bangladesh, 1995.
171. Fish & Fish Products (Inspection & Quality Control) Rules, 1997 (Amended in 2008), Government of Bangladesh, 2008.
172. Pure Food Act, 2005, Government of Bangladesh, 2005.
173. Bangladesh Accreditation Act, 2006, Government of Bangladesh, 2007.
174. Packaged Commodities Rules, 2007, Government of Bangladesh, 2007.
175. The Consumers' Right Protection Act, 2009, Government of Bangladesh, 2009.
176. National Food Safety Policy 2006, Government of Bangladesh, 2006.

TECHNICAL REGULATIONS ENFORCED BY EU, USA, JAPAN & CANADA

177. Mandated levels and testing requirements for pesticide residues in agricultural products Federal Insecticide, Fungicide and Rodenticide Act (FIFRA, 1947, as amended), the Federal Food, Drug and Cosmetic Act (FFDCA) and associated regulations: 7USC1360, 21USC1401 and 40CFR152-180, USA, 1947.
178. Restrictions and labeling requirements for formaldehyde in wood products Toxic Substances Control Act (15USC2601 [findings, policy and intent] and 15USC2612 [entry into customs territory of the United States]) and the Federal Hazardous Substances Act - regulations - USC Title 15 1261, USA, 1947.
179. Restrictions on solid wood packaging and material. 7CFR 319.40 Restrictions on solid wood packaging material from China - US Entry Requirements longhorn beetle, US7CFR301, USA, 1947.
180. Requirements for sampling and testing of food and fisheries products HACCP Systems: Hazard Analysis Critical Control Point, USA, 1947.
181. Prescribed energy conservation standards for certain major household appliances Energy Policy and Conservation Act, as amended by the National Energy Conservation Policy Act and the National Appliance Energy Conservation Act and the National Appliance Energy Conservation Act and the National Appliance Energy Conservation Amendments.
182. Corporate average fuel economy standards for light trucks Light Truck Average Fuel Economy Standards Model Years 2005-07 49 CFR Part 533, USA, 1947.

183. Fumigation requirements for horticultural products Plant Quarantine Act, Japan, 1947.
184. Exhaust emissions standards for light and heavy vehicles Safety Regulations for Road Vehicles, Japan, 1947.
185. Requirements for labeling of GM products The Food Sanitation Law, Japan, 1947.
186. Maximum limits on sulfur in diesel fuel Sulphur in Diesel Fuel Regulations (SOR/2002-254), Canada, 2002.
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188. Mandated emissions standards for on road vehicles and engines On road vehicle and engine emission regulations, Canada, 1999.
189. Regulations limiting aflatoxin levels in food products Commission Regulation 466/2001 setting maximum levels for certain contaminants in foodstuffs, EU, 2001.
190. Restrictions on azo colourants in textile products. Directive 2002/61/EC amending for the nineteenth time Directive 76/769/EEC relating to restrictions on the marketing and use of certain dangerous substances and preparations (azo colorants), EU, 2002.

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196. Ensuring Traceability of Chemical Measurements, Nineta Majcen, Paper Presented at The Session No. 3 Towards an Integrated European Infrastructure (http://ec.europa.eu/research/growth/warsaw/pdf/2002_warsaw_nineta_majcen_publ.pdf), International Conference on "Towards an Integrated Framework for Measurements", Organized by European Commission, Warsaw, Poland, 18-19 June 2002.

ANNEXURE-A**QUESTIONNAIRE FOR SURVEY ON CHEMICAL ANALYSES & MEASUREMENTS:
THE NEEDS OF BANGLADESH****TERMS OF REFERENCE****A. THE MAIN GOALS OF THE STUDY**

The main goals of the study are:

1. To obtain information about the present situation of needs, volumes and variety of chemical analyses and measurements in Bangladesh.
2. To obtain information about the present situation and needs for training and consultation in the field of chemical analyses and measurements in Bangladesh.
3. To obtain information about the coming trends in Bangladesh in the field of chemical analyses and measurements.

B. METHODS

1. Questionnaire survey (sample size in the order of 100) involves mainly industrial enterprises (specifically: enterprises of food industry, water production and wastewater management, chemical industry), but also other (including public) institutions and laboratories.

2. Analysis of legislation and directives of the main trading partners or importing economies EU, USA, Japan
3. Analysis of results of previous analogous projects and analysis of data of Bangladeshi national monitoring programs.
4. Discussions with Bangladeshi leading experts from industry and also from the field of analyses and measurements.

C. EXPECTED RESULTS

The final report presents the results of the tasks given in section A:

1. Estimates of the present volumes and needs for chemical analyses and measurements in Bangladesh.
2. Overview of trends reported by experts and revealed by the results of the questionnaires and analysis of them.
3. Assessment of the present situation in education, training and consultation in the field of chemical analyses and measurements in Bangladesh.
4. Analysis of legislation from the standpoint of chemical measurements and analyses.
5. The analysis of the results of the entire study and proposals about which kinds of chemical analyses and measurements are to be preferably developed, what methods of measurements and analysis should be more stressed in education, training and consultation etc.

The final report will be submitted to Ministry of Science and Information & Communication Technology, GoB. The language of the final report is English.

D. TIME TABLE OF THE WORK

Time	Action	Comments
June 20XX	<ul style="list-style-type: none"> Initiation of the project by MoS&ICT 	
1-15 July 20XX	<ul style="list-style-type: none"> Maturing of the Description of Task Drafting the work-plan Compilation of the questionnaires 	
16-31 July 20XX	<ul style="list-style-type: none"> Delivering the questionnaire Start of compilation of the final report template Start of analyzing the legislation 	
24 July 20XX	<ul style="list-style-type: none"> Contract signed between the MoS&ICT & ICSL 	
August 20XX	<ul style="list-style-type: none"> Delivering the questionnaire Start of analysis of legislation Start of compiling the final report 	
1-15 Sept 20XX	<ul style="list-style-type: none"> Delivering the questionnaire Collecting data from the questionnaires Treatment of the data obtained from the questionnaires. Interviews with experts Finishing analyzing the legislation Compiling the final report 	
16-30 Sept 20XX	<ul style="list-style-type: none"> Interviews with experts Finalizing the final report 	
24 September 20XX	<ul style="list-style-type: none"> Deadline of presenting the final report to MoS&ICT 	

E. TEXT OF THE QUESTIONNAIRE FOR SURVEY: NEEDS FOR CHEMICAL ANALYSES AND MEASUREMENTS IN BANGLADESH

E.1. Introduction-explanation

The questionnaire given on the following pages is one part of the ongoing project aiming at implementation of Bangladesh chemical metrology strategy (strategy of measurements and analyses). The project is coordinated by ICSL, BCSIR, Ministry of Science and Information & Communication Technology, GoB.

The present questionnaire focuses mainly on chemical measurements and analyses (air moisture and air flow velocity only are involved of physical measurements, the rest will be examined in a separate survey). The principal aim of this research is to get information on the needs, volumes and variety of chemical analyses and measurements carried out in Bangladesh in order to describe the present situation and trends in this field.

The data gathered will be used to plan what kind of analyses and measurements are to be preferably developed in Bangladesh, to which extent different kinds of analyses and measurements are expected to be needed in the future and also which methods of analysis and measurements are to be emphasized in education, training and consulting etc carried out at universities.

Your answers to this questionnaire (and also information about You and Your enterprise) will not be published or distributed by any means, only generalizations done on the basis of these answers will be used.

Thank You in advance!

Sd/-

(Mala Khan)
Principal Investigator

E.2 Some general advice on filling in this questionnaire

- The questionnaire can be filled in by means of computer just by typing in the file or writing down the answers on the printout of the questionnaire

The questions can be answered by one person or by a group (there are several quite specific questions that a specialist can answer best whereas the director of an institution/enterprise may be better informed concerning the general part of this questionnaire).

- You are not expected to report exact numerical data, just give orders of magnitude or ranges.
- In the case of questions with checkboxes You are always welcome to specify a different answer if checkbox answers do not reflect the real situation precisely enough.

If you have any questions/problems concerning filling in this questionnaire, please contact : Ms.Mala Khan, Email: malakhan_07@yahoo.com, Tel: 01715032057

F. QUESTIONNAIRE

Q.1 General Questions

- (1) Name of institution/enterprise
- (2) Main field of activity of institution/enterprise
- (3) Approximate number of employees in institution/enterprise
- (4) Your contacts, if possible (name, e-mail, phone)
- (5) Your position in institution/enterprise, if possible

Q.2 Analyses and measurements, the need for them

- (6) Does Your institution/enterprise use (i.e. performs itself or orders) analyses/ measurements/ tests for some of the following purposes (tick several answers if necessary):
 - for inspection and quality control of raw materials
 - for manufacturing processes control
 - for production control
 - for working environment control
 - analyses/ measurements are the main field of activity of institution/enterprise for other purposes (please describe, if possible)
- (7) Please predict the change in the need for measurements/analyses in Your institution/enterprise during the next years
 - remains the same
 - increases
 - decreases
- (8) Please comment on your prognosis briefly.
- (9) Which are the present trends in analyses in Your opinion? (Tick several answers if necessary)
 - increase of importance instrumental analysis
 - increasing importance of quality management of the results of analyses
 - increasing importance of reference materials and interlaboratory comparison measurements (intercalibrations)
 - increasing importance of being accredited

- tendency to lower limits of detection
- tendency to increase in the number of analytes/parameters determined
- anything else that is not mentioned here (please describe briefly)

Q.3 Laboratory

- (10) Does Your institution/enterprise have a laboratory (laboratories)? (if YES, please continue with the next question; if NO, please go on to the question 36)
- (13) Approximately how many analyses/measurements are carried out in the laboratory per year? (If there are several parameters or analytes determined in one sample, every parameter will be counted as a separate analysis ?)
- (14) How many of these are chemical analyses?

- (15) What are the approximate annual volumes of the following types of chemical analyses:

- determination of metals (Ca, Mg, Fe, Pb, ...)
- determination of anions (phosphate, chloride, nitrate)
- determination of basic organic constituents (proteins, lipids)
- determination of organic contaminants or pollutants (pesticides, PCBs, PAHs)

Note † : The concept "chemical analysis" was used in the same meaning as "chemical measurement" in the questionnaire, because the term "chemical measurement" is somewhat alien to the vocabulary of most laboratory people.

- determination of other organic microconstituents (food additives (preservatives, food colours,...), bioactive compounds (vitamins, hormones,...))
- determination of various parameters i.e. pH, hardness, TOC, BOD, total acidity, total alkalinity, ... laboratory diagnosis for clinical or veterinary purposes
- some other analyses which You could not classify under the categories given above (please describe if possible)

- (16) How many microbiological analyses are carried out per year?

- (17) How many physical measurements?

- (18) How many of the physical measurements are measurements of air humidity?

- (19) How many of these are measurements of air flow velocity?

- (20) How many are there other kinds of measurements, analyses or tests, which you could not classify under the categories given above?
- (21) How many people work in the laboratory?
- (22) How do You estimate the competence of the staff and their need for training? (Tick several answers if necessary)
- competence is sufficient, they don't need any training
 - more or less sufficient, but sometimes there is a need for training
 - it depends, training is needed
 - insufficient, there is an urgent need for training
 - competence is sufficient in the present situation (or more or less sufficient), but training is needed anyway, because everything changes all the time
- (23) Please point out the fields where the training is most needed? (Tick several answers if necessary)
- general problems concerning work in laboratory
 - methods that are in use at your laboratory
 - methods, which are not yet in use in your laboratory, but are becoming important due to new requirements or regulations
 - instrumental/technical training
 - safety requirements
 - questions concerning accreditation
 - legislation (Bangladeshi and EU/USA/Japan requirements regulations)
 - any other field (describe, please)
- (24) Has there been a need for a consultation with a specialist outside your laboratory? If yes, then in what field?
- reliability (measurement uncertainty) of chemical analyses
 - practical application of methods of analysis
 - method validation
 - technical questions concerning application of analytical equipment
 - reference materials or certified chemicals
 - any other possibilities (please describe)

- (25) Please predict the change in the intensity of work in your laboratory during the next few years. remains the same
- increases
 - decreases
- (26) Please comment on your prognosis briefly
- (27) In general, are you satisfied with functioning of the laboratory (tick several answers if necessary)?
- very satisfied
 - more or less satisfied
 - it depends
 - not satisfied in most cases
 - not satisfied
 - in general satisfied, but there is a need for a continuous development
- (28) Please point out the main problems in/of the laboratory. What could be better?
- 29) Does the laboratory participate in interlaboratory comparison measurements/intercalibrations? (if YES, please continue with the next question; if NO, please go on to the question 33)
- (30) In approximately how many interlaboratory comparison measurements/intercalibrations does the laboratory participate per year?
- (31) Approximately how many of these are international?
- (32) Please predict the trend in participating in interlaboratory comparison measurements/intercalibrations during the next few years.
- increases
 - decreases
 - remains the same
 - any other possibility or comments (please describe)
- (33) Does the laboratory use reference materials (if YES, please continue with the next question; if NO, please go on to the question 36)
- (34) Please give the approximate number of reference materials used in the laboratory.
- (35) Please estimate the trend in the use of reference materials during the next few years.

- increases
- decreases
- remains the same
- any other possibilities or comments (please describe)

Q.4 Measurements/analyses ordered from outside the laboratory

(36) Does Your institution/enterprise order any analyses/measurements outside (i. e. from other laboratories in Bangladesh or abroad)? (If YES, please continue with the next question; if NO, please go on to the question 46)

(37) Approximately how many analyses/measurements are ordered annually? From now on till question 44 please give separate estimates of the analyses/measurements ordered

- from Bangladesh and from abroad.
- from Bangladesh
- from abroad

(38) How many of them are chemical analyses?

- from Bangladesh
- from abroad

(39) How many of chemical analyses are the following:

from Bangladesh / from abroad

- / determination of metals (Ca, Mg, Fe, Pb, ...)
- / determination of anions (phosphate, chloride, nitrate, ...)
- / determination of major organic constituents (proteins, fats, ...)
- / determination of organic pollutants (pesticides, PCBs, PAHs, ...)
- / determination of other organic microconstituents (food additives (preservatives, food colors, ...), bioactive compounds (vitamins, hormones, ...))
- / determination of parameters, e.g. pH, hardness, TOC, BOD, total acidity, total alkalinity, ...
- / laboratory diagnosis for clinical or veterinary purposes
- / any other analyses that you could not classify under the categories given above (please describe if possible)

(40) How many microbiological analyses?

- from Bangladesh
- from abroad

(41) How many physical measurements?

- from Bangladesh
- from abroad

(42) How many of these are measurements of air humidity?

- from Bangladesh
- from abroad

(43) How many of these are measurements of air flow velocity?

- from Bangladesh
- from abroad

(44) How many other measurements, analyses or tests that you could not classify under the categories given above?

- from Bangladesh
- from abroad

**(45) What are your main criteria in choosing where to order an analysis or measurement?
(mark everything You consider to be significant, if possible in the order of importance)**

- price
- time needed to get the results
- the declared accuracy of the result
- reliability of the result
- accreditation of the performer of an analysis/measurement
- well-working system and good contacts
- confidentiality
- anything else (please describe)

(46) Do you have (or had in the past) situations when there is a sudden/unusual problem/trouble that needs an analysis/measurement to be carried out cannot be solved by Your own laboratory (if there is a one)? (if YES, please continue with the next question; if NO, please go on to the question 50)

(47) Please describe the problem briefly, if possible

(48) How have these situations been solved? (Tick several answers if necessary)

- It has been quite simple to find a laboratory for carrying out the analysis/measurement needed

- it has been quite a big problem to find a laboratory for carrying out the analysis/measurement needed
- the problem was solved by other means (please describe if possible)
- the problem could not be solved reasonably and caused a lot of trouble for us (expenses, complaints etc.)
- any other possibilities (please describe if possible)

(49) Please estimate the quality of the solutions. (Tick several answers if necessary)

- we are satisfied
- we are satisfied in principle, but finding the solutions was time-consuming and tiresome
- we are not satisfied at all
- this problem is still actual for us
- any other possibilities (please describe if possible)

(50) Is there anything else You consider to be worth to mention concerning the field of analyses/ measurements?

Thank You for answering!

Please send the filled questionnaire to Ms.Mala Khan, Project Director, Instrumentation & Calibration Service Laboratory ICSL BCSIR, by one of the following means:

1. by e-mail: malakhan_07@yahoo.com
2. by fax: 880-2-8613022 (please specify Ms.Mala Khan as recipient) or
3. by letter to Ms.Mala Khan, Project Director, Instrumentation & Calibration Service Laboratory (ICSL), Physical Instrumentation Division, Bangladesh Council of Scientific and Industrial Research, Dr.Kudrat-E-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh

ANNEXURE-B

A NEEDS ASSESSMENTS SURVEY FOR DEVELOPING BCSIR INSTRUMENTATION CALIBRATION SERVICES FOR INDUSTRIAL GMP & GLP

QUESTIONNAIRE

1.0 INTRODUCTION

This survey seeks to assess the calibration demand in Bangladesh. It is concerned with developing the calibration facilities in the "BCSIR Instrumentation & Calibration Section" and will examine current arrangements, and possible future needs to be essential to meet GMP & GLP and or other trade and regulatory requirement in industries, scientific/ testing organization and research institutes.

The following questionnaire has been prepared to facilitate the collection of information prior to visit your production & QC Laboratory facilities by the "BCSIR Calibration Needs Assessment Team" headed by undersigned.

It would highly be appreciated if your good office please allow the concerned officials (Production Head, QA Manager, QC Manager) within your plant/facility responsible GMP & GLP, to complete the attached questionnaire so as to provide the information on specific parameters, equipment, precision/ accuracy requirement for periodic routine calibration.

Due confidentiality will be maintained regarding your sensitive company information, if any. General results/ statistics and outcome of the study would be published in a scientific paper and through a seminar without disclosing your company information publicly.

Would you please fill out the questionnaire accordingly and provide the copy via email or fax to undersigned. If you have any question, in the mean time, please feel free to contact us.

Awaiting your kind support and cooperation in this regards,

Sd/-

Ms. Mala Khan

Principal Investigator (BCSIR Calibration Needs Assessment Team)

&

Section - In - Charge

Instrumentation & Calibration Section

Physical Instrumentation Division, BCSIR Laboratories, Dhaka

BCSIR, Dr. Kudrat-E-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh

Email: mala_khan07@yahoo.com

Fax: 880-2-8613022

Mob: 01715032057

2.0 QUESTIONNAIRE

Please complete the form below and add more sheet, if required.

A. Name & Address of Your Organization :

Tel:

Fax:

Email:

Contact Person:

B. Business Sector:

C. Name and Designation of the Officials to be Interviewed :

a.

b.

c.

D. Facility for Visit :

Plant [GMP Area] QC Laboratory [GLP Area] Other (specify):

E. Date of Visit/Interview (dd/mm/yyyy):

F. Is your organization/industry already certified ?

Yes No

If Yes, then as per ISO9000 series ISO140001 Other (Specify)

If No, are you planning have your organization certified ?

within next 01 year within next 02 years

within next 03 years Not Known

G. Is your Laboratory already Accredited ?

Yes No

If Yes, then tick ISO/IEC 17025 ISO/IEC15189

Specify the field(s)/scope:

If No, are you planning have your organization accredited ?

within next 01 year within next 02 years

within next 03 years Not Known

H. Calibration Requirements for Measuring Devices Operating In-Plant/Online/Production Floor (in GMP Area) :

Please add more sheet, if required.

Parameter (1)	Name of Measuring Device (2)	Model & Manufacturer (3)	Qty. (4)	Operating Range (5) (Unit)	Operating Position(s) (6)	Accuracy Limit (7)	Precision Limit (8)	Calibration Frequency (9)	Requirement (10)	Requirement Reference (11)	Calibration Priority (12)	Current Arrangement (13)	Remarks (14)
								<input type="checkbox"/> Daily <input type="checkbox"/> Weekly <input type="checkbox"/> Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/> Half-yearly <input type="checkbox"/> Yearly <input type="checkbox"/> Other (specify)	<input type="checkbox"/> GMP <input type="checkbox"/> GLP <input type="checkbox"/> ISO 9000 <input type="checkbox"/> ISO 14000 <input type="checkbox"/> Accreditation <input type="checkbox"/> GOB <input type="checkbox"/> Regulatory <input type="checkbox"/> Other (specify)		<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High	<input type="checkbox"/> Local <input type="checkbox"/> Foreign <input type="checkbox"/> Other	
								<input type="checkbox"/> Daily <input type="checkbox"/> Weekly <input type="checkbox"/> Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/> Half-yearly <input type="checkbox"/> Yearly <input type="checkbox"/> Other (specify)	<input type="checkbox"/> GMP <input type="checkbox"/> GLP <input type="checkbox"/> ISO 9000 <input type="checkbox"/> ISO 14000 <input type="checkbox"/> Accreditation <input type="checkbox"/> GOB <input type="checkbox"/> Regulatory <input type="checkbox"/> Other (specify)		<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High	<input type="checkbox"/> Local <input type="checkbox"/> Foreign <input type="checkbox"/> Other	
								<input type="checkbox"/> Daily <input type="checkbox"/> Weekly <input type="checkbox"/> Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/> Half-yearly <input type="checkbox"/> Yearly <input type="checkbox"/> Other (specify)	<input type="checkbox"/> GMP <input type="checkbox"/> GLP <input type="checkbox"/> ISO 9000 <input type="checkbox"/> ISO 14000 <input type="checkbox"/> Accreditation <input type="checkbox"/> GOB <input type="checkbox"/> Regulatory <input type="checkbox"/> Other (specify)		<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High	<input type="checkbox"/> Local <input type="checkbox"/> Foreign <input type="checkbox"/> Other	

I. Calibration Requirements for Measuring Devices Operating in the QC Laboratory (in GLP Area): Please add more sheet, if required.

Parameter (1)	Name of Measuring Device (2)	Model & Manufacturer (3)	Qty. (4)	Operating Range (5) (Unit)	Operating Position(s) (6)	Accuracy Limit (7)	Precision Limit (8)	Calibration Frequency (9)	Requirement (10)	Requirement Reference (11)	Calibration Priority (12)	Current Arrangement (13)	Remarks (14)
								<input type="checkbox"/> Daily <input type="checkbox"/> Weekly <input type="checkbox"/> Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/> Half-yearly <input type="checkbox"/> Yearly <input type="checkbox"/> Other (specify)	<input type="checkbox"/> GMP <input type="checkbox"/> GLP <input type="checkbox"/> ISO 9000 <input type="checkbox"/> ISO 14000 <input type="checkbox"/> Accreditation <input type="checkbox"/> GOB <input type="checkbox"/> Regulatory <input type="checkbox"/> Other (specify)		<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High	<input type="checkbox"/> Local <input type="checkbox"/> Foreign <input type="checkbox"/> Other	
								<input type="checkbox"/> Daily <input type="checkbox"/> Weekly <input type="checkbox"/> Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/> Half-yearly <input type="checkbox"/> Yearly <input type="checkbox"/> Other (specify)	<input type="checkbox"/> GMP <input type="checkbox"/> GLP <input type="checkbox"/> ISO 9000 <input type="checkbox"/> ISO 14000 <input type="checkbox"/> Accreditation <input type="checkbox"/> GOB <input type="checkbox"/> Regulatory <input type="checkbox"/> Other (specify)		<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High	<input type="checkbox"/> Local <input type="checkbox"/> Foreign <input type="checkbox"/> Other	
								<input type="checkbox"/> Daily <input type="checkbox"/> Weekly <input type="checkbox"/> Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/> Half-yearly <input type="checkbox"/> Yearly <input type="checkbox"/> Other (specify)	<input type="checkbox"/> GMP <input type="checkbox"/> GLP <input type="checkbox"/> ISO 9000 <input type="checkbox"/> ISO 14000 <input type="checkbox"/> Accreditation <input type="checkbox"/> GOB <input type="checkbox"/> Regulatory <input type="checkbox"/> Other (specify)		<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High	<input type="checkbox"/> Local <input type="checkbox"/> Foreign <input type="checkbox"/> Other	

J. If capacity developed are you willing to avail the CALIBRATION services from BCSIR?

- Yes No

If yes what basis

* Annual contractual basis * On Demand * Other (Specify)

K. According to your understanding is there any other calibration service provider in Bangladesh?

- Yes No Not Known

(If yes)

- Bangladeshi Foreign Other

Name :

Address :

Contact Details, if known :

L. Overall Service Cost/Performance from other Calibration Service Provider (s) is acceptable to you?

- Yes No

Existing cost/rates are ?

- Low Medium High Too high

M. Your Current Annual Expenditure for Calibration (approx.) in BDTk.

N. Do you face any problem to meet your current calibration demand?

- Yes No

O. Are you willing to outsource Instrumentation Services (i.e. Equipment Qualifications: EQ) other than Calibration Services?

- DQ IQ OQ PQ PM Training on Instrumentation & LQMS)‡

‡ LQMS= Laboratory Quality Management System

Other (pl. specify):

P. How Frequently you are in need of EQ services :

- Daily Weekly Monthly Quarterly Half-yearly yearly Other (specify):

Q. If the capacity developed are you willing to avail the EQ & Training Services from BCSIR?

- Yes No

R. How do you grade the availability of Education & Training on Conformity Assessment, Laboratory Quality Management System, Standards, Quality Uncertainty, Accreditation, Calibration, Metrology in the country?

- Excellent Very Good Good Adequate
 Needs to be improved Poor Not known

S. To your knowledge who is providing training on the topic mentioned in the section R above, please specify?

T. How do you grade the supply/availability of the Certified Analytical/Appropriate Grade Laboratory Reagents/Chemical, Certified Calibration Standards, Standards Reference Materials (SRM), Certified Reference Materials (CRM) etc.

- Excellent Very Good Good Adequate
 Needs to be improved Poor Not known

What kind of problems, generally, you face?

U. Any other comments, recommendations, requirements specific to your industry or organization you want to mention relating to conformity assessments or calibration : [Attach pages if required]

V. Will you allow the "investigator" to publish the general and consolidated findings/ statistics in a technical/ scientific paper and through a seminar, without disclosing your specific confidential company information?

Yes

No

If yes, please list the Section No. above you would like to keep confidential [Note: It is hereby rest assured that your information would be kept confidential unless otherwise you allowed]:

Thank you again for your kind cooperation.

With regards,

Ms. Mala Khan

Principal Investigator (BCSIR Calibration Needs Assessment Team)

&

Section - In - Charge

Instrumentation & Calibration Section

Physical Instrumentation Division, BCSIR Laboratories, Dhaka

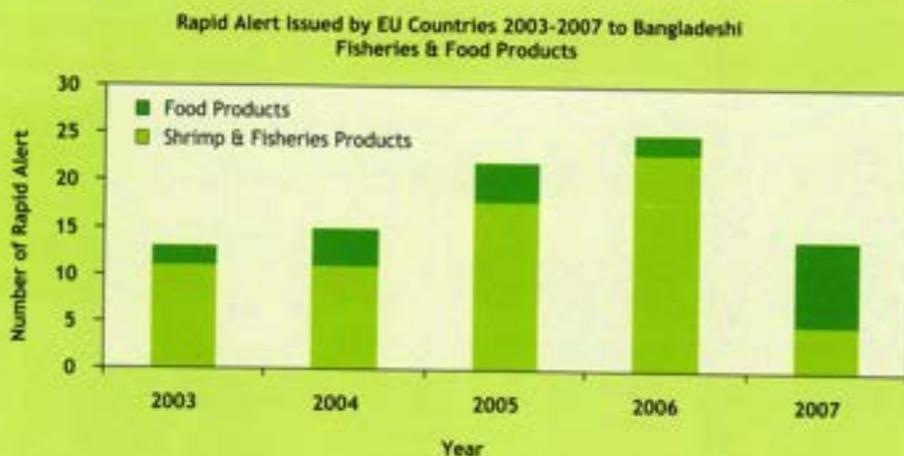
ANNEXURE-C

LIST OF RAPID ALERTS TO BANGLADESHI FISHERIES AND FOOD PRODUCTS ISSUED BY EU COUNTRIES AT THE PORT OF ENTRY (POE) POINT 2003 TO 2007

(Source DG SANCO, European Commission, October 2007)

Note: * Weekly Rapid Alert Reports began in June 2003

Shrimp & Fisheries Products	11	11	18	23	5
Food Products	2	4	4	2	9
Total Rapid Alert Issued	13	15	22	25	14



2003*	Product	Defect	Reporting Country	Week No.
June	Frozen sea water black tiger cooked shrimps	Nitrofurans (metabolite) Furazolidone (AOZ)	UK	23
July	Powdered radhuni, capsicum, turmeric, coriander, cumin, curry for meat, garam masala, meat, garam masala, haleem mix, chatpati mix, ruchi chanachur, puffed rice, coconut oil	Labelling incorrect Parasites	Italy	29
August	Frozen head-on king shrimps	Nitrofurans (metabolite) Nitrofurazone (SEM)	Germany	31
September	-	-	-	-
October	Frozen pawns tails	Salmonella	France	43
November	Frozen pawns tails (Penaeus monodon)	Salmonella	France	44

	4 Rapid Alerts for frozen freshwater shrimps headless (<i>Macrobrachium rosenbergii</i>)	Nitrofurans (metabolite) - Nitrofurazone (SEM)	UK	46
	Frozen prawns	Nitrofurans (metabolite)- Nitrofurazone (SEM)	UK	47
	Frozen prawn tails (<i>Penaeus monodon</i>)	Salmonella	France	47
	Giant freshwater shrimp tails	Quicksilver (mercury) droplets	Luxembourg	47
December	Raw shrimp tails (<i>Penaeus monodon</i>)	Salmonella	France	48
	Cooked and peeled prawns	Aerobic mesophiles	UK	49
	Crown farms warm water prawns	Semicarbazide (SEM)	UK	50

2004	Product	Defect	Reporting Country	Week No.
January	Frozen shrimps	Salmonella and coliforms	France	02
February	Frozen black tiger shrimps (<i>Penaeus monodon</i>)	Vibrio cholerae NON O:1/NON O:139	Norway/ESA	05
	Frozen warm water prawns (<i>Macrobrachium rosenbergii</i>)	Nitrofurans (metabolite) - nitrofurazone (SEM)	UK	05
	Cooked and peeled shrimps (<i>Metapenaeus monoceros</i>)	High aerobic plate counts	UK	06
March	Cooked and peeled prawns (<i>Metapenaeus monoceros</i>)	Aerobic plate counts	UK	10
	Frozen black tiger shrimps (<i>Penaeus monodon</i>)	Vibrio cholerae NON O:1/NON O:139 and Vibrio parahaemolyticus	Norway / ESA	12
	Warm water shrimps	Semicarbazide (SEM)	UK	13
April	-	-		
May	-	-		
June	Meat and vegetable masala	Lead	UK	20
July	-	-		
August	-	-		
September	2 Rapid Alerts for frozen fresh water headless shell-on shrimps (<i>Macrobrachium rosenbergii</i>)	Nitrofurans (metabolite) - nitrofurazone (SEM)	UK	35
	Mixed pickle	Erucic acid	UK	37
	Mango hot pickle	Erucic acid		37
October	-	-		
November	Olive pickle and mixed pickle	Erucic acid	UK	46
	Fresh water headless frozen shrimps (<i>Macrobrachium rosenbergii</i>)	Nitrofurans (metabolite)- nitrofurazone (SEM)	UK	49
	Fresh frozen raw headless water king prawns (<i>Macrobrachium rosenbergii</i>)	Nitrofurans (metabolite) - nitrofurazone (SEM)	UK	49
December	-	-		

2005	Product	Defect	Reporting Country	Week No.
January	Giant seawater king prawns - black tiger (<i>Peneaus monodon</i>)	Staphylococcus aureus enterotoxin	Belgium	02
	2 Rapid Alerts frozen shrimps (<i>Macrobrachium rosenbergii</i>)	Nitrofurans (metabolite) - nitrofurazone (SEM)	UK	03
February	Satkora pickle	Erucic acid in	UK	06
March	Frozen shrimps (<i>Macrobrachium rosenbergii</i>)	Nitrofurans (metabolite) - nitrofurazone (SEM)	Belgium	12
April	3 Rapid Alerts for frozen shrimps (<i>Macrobrachium rosenbergii</i>)	Nitrofurans (metabolite) - nitrofurazone (SEM)	UK	17
	Frozen shrimps (<i>Peneaus monodon</i> + <i>Macrobrachium rosenbergii</i>)	Nitrofurans (metabolite) - nitrofurazone (SEM)	UK	17
	Raw fresh water shrimp shell on	Nitrofurans (metabolite) - nitrofurazone (SEM)	UK	17
May	Raw fresh water headless shell on prawns (<i>Macrobrachium rosenbergii</i>)	Nitrofurans (metabolite) - nitrofurazone (SEM)	UK	18
	Frozen shrimps (<i>Macrobrachium rosenbergii</i>)	Nitrofurans (metabolite) - nitrofurazone (SEM)	UK	20
	Frozen fresh water head less shell on shrimps (<i>Macrobrachium rosenbergii</i>)	Nitrofurans (metabolite) - nitrofurazone (SEM)	UK	21
June	Raw and cooked frozen black tiger shrimps (<i>Peneaus monodon</i>)	<i>Vibrio cholerae</i>	Sweden	23
	Frozen shrimps (<i>Metapeneaus monoceros</i>)	Too high count of aerobic mesophiles	Belgium	23
	Raw headless shrimps (<i>Macrobrachium rosenbergii</i>)	Nitrofurans (metabolite) - nitrofurazone (SEM)	UK	26
July	2 Rapid Alerts for black tiger shrimp (<i>Peneaus monodon</i>)	<i>Vibrio cholerae</i> NON O:1/NON O:139 and <i>Vibrio parahaemolyticus</i>	Norway	29
	Frozen black tiger shrimps (<i>Peneaus monodon</i>)	<i>Vibrio parahaemolyticus</i>	Norway	30
	Frozen black tiger shrimp (<i>Peneaus monodon</i>)	<i>Vibrio cholerae</i> , <i>Vibrio cholerae</i> NON O:1/NON O:139 and <i>Vibrio parahaemolyticus</i>	Norway	30
August	-	-	-	-
September	Freshwater headless frozen shrimps (<i>Macrobrachium rosenbergii</i>)	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	UK	37
	Headless shell-on frozen shrimps	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	UK	39
October	Chilli powder	<i>Bacillus subtilis</i>	UK	43
November	Headless frozen king prawns (<i>Macrobrachium rosenbergii</i>)	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	UK	45
	Garlic pickle in oil	Unauthorised colour Sudan 1	UK	46
	Fried peanuts	Aflatoxins	UK	47
December	-	-	UK	47

2006	Product	Defect	Reporting Country	Week No.
January	-	-	-	-
February	Raw frozen headless shell-on shrimps (<i>Macrobrachium rosenbergii</i>)	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	UK	05
	Farmed fresh water headless shell on prawns	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	UK	08
	Snacks product containing peanuts (hot chanachur)	Aflatoxins	UK	08
	Raw headless shell on king prawns (<i>Macrobrachium rosenbergii</i>)	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	UK	08
March	Fresh water headless shell on king prawns (<i>Macrobrachium rosenbergii</i>)	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	UK	10
April	Freshwater headless shell on shrimps (<i>Macrobrachium rosenbergii</i>)	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	Belgium	13
	Fresh water king prawns	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	UK	13
May	Long grain processed rice	Parasites	Italy	17
	Frozen shrimp headless shell on (<i>Macrobrachium rosenbergii</i>)	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	UK	17
	Frozen shrimps	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	UK	18
	Frozen shrimp headless shell on	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	UK	18
	Frozen raw freshwater headless shell on shrimps	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	UK	21
June	Raw headless shell on fresh water shrimps	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	UK	24
July	Frozen shrimps (<i>Macrobrachium rosenbergii</i>)	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	Italy	26
	2 Rapid Alerts for raw headless shell on fresh water shrimps	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	UK	26
	3 Rapid Alerts raw headless shell on fresh water prawns	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	UK	28
	Fresh water frozen shrimps (<i>Macrobrachium rosenbergii</i>)	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	UK	28
	Raw fresh water headless shell on shrimps	Unauthorised substance nitrofurans (metabolite) - nitrofurazone (SEM)	UK	29

	Frozen headless fresh water shell on shrimps	Unauthorised substance nitrofuran (metabolite) - nitrofurazone (SEM)	UK	29
	3 Rapid Alerts for raw headless shell on fresh water shrimps	Unauthorised substance nitrofuran (metabolite) - nitrofurazone (SEM)	UK	29
August	Frozen king prawns (Macrobrachium rosenbergii)	Unauthorised substance nitrofuran (metabolite) - nitrofurazone (SEM)	UK	30
	Raw shell on king prawns	Unauthorised substance nitrofuran (metabolite) - nitrofurazone (SEM)	UK	30
	Frozen king prawns	Unauthorised substance nitrofuran (metabolite) - nitrofurazone (SEM)	UK	34
	Farmed freshwater shrimps	Unauthorised substance nitrofuran (metabolite) - nitrofurazone (SEM)	UK	34
September	Frozen raw black tiger shrimps (Penaeus monodon)	Unauthorised substance nitrofuran (metabolite) - furazolidone (ADZ)	UK	36
October	-	-	-	-
November	2 Rapid Alerts for king prawns	Unauthorised substance nitrofuran (metabolite) - nitrofurazone (SEM)	UK	44
December	-	-	-	-

2007	Product	Defect	Reporting Country	Week No.
January	-	-	-	-
February	Whole frozen black tiger shrimps (Penaeus monodon)	Unauthorised substance chloramphenicol	Greece	07
March	-	-	-	-
April	Satkara hot pickle	Erucic acid	UK	14
	Frozen raw brown head-on shrimps	Unauthorised substance nitrofuran (metabolite) - nitrofurazone (SEM) (9.1 µg/kg - ppb)	UK	15
	Frozen freshwater shrimp (Macrobrachium rosenbergii)	Unauthorised substance nitrofuran (metabolite) - nitrofurazone (SEM) (7.5 mg/kg - ppm)	UK	15
May	Crushed chilli	Aflatoxins (B1 = 49.3; Tot. = 50.9 µg/kg - ppb)	Greece	21
June	Mango hot pickle	Erucic acid (56.2 % of the fatty acid content)	UK	23
July	Frozen peeled red shrimps (Metapenaeus monoceros)	Spoilage	Germany	27
	Frozen fresh water headless shell on easy peel shrimps (Macrobrachium rosenbergii)	Unauthorised substance nitrofuran (metabolite) - nitrofurazone (SEM) (1 µg/kg - ppb)	Italy	29

	Green chilly pickle	Unlabeled E 210 - benzoic acid (895 mg/kg - ppm) and unauthorised colour Sudan 1 (13 mg/kg - ppm)	Italy	29
August	Pickled olives	Erucic acid (43% of the fatty acid content)	Italy	31
	Mango pickle	Erucic acid (43. 2% of the fatty acid content)	Italy	34
	Mango pickle	Erucic acid (6. 9% of the fatty acid content)	Italy	34
September	-	-	-	-
October	Bombay mix (chanachur)	Aflatoxins (B1 = 13. 6; Tot. = 16. 8 µg/kg - ppb)	Italy	40
	Nut snack (chanachur)	Aflatoxins (B1 = 17; Tot. = 20 / B1 = 105; Tot. = 127 / B1 = 7. 2; Tot. = 8. 7 / B1 = 3. 8; Tot. = 4. 6 / B1 = 17; Tot. = 20 / B1 = 8. 6; Tot. = 10 µg/kg - ppb)	UK	43
November	-	-	-	-
December	-	-	-	-

ANNEXURE-D

CHEMICAL MEASUREMENTS ESSENTIAL FOR EXPORTING THE PROCESSED AND FROZEN FOODS & AGRICULTURAL PRODUCTS

- | | | |
|---|----------------------------|---------------------------|
| 1. Fruit Juice | 20. Rose water | 41. Honey |
| 2. Fruit Drinks | 21. Tomato sauce/ketchup | 42. Frozen mushroom |
| 3. Biscuit | 22. Tomato paste | 43. Papor |
| 4. Chanachur | 23. Nodules | 44. Jarda |
| 5. Prepared nuts | 24. Extruded snacks | 45. Frozen Kachur Loti |
| 6. Fried peanuts | 25. Mango & fruit bar | 46. Frozen Kachur mukhi |
| 7. Potato Crackers | 26. Kashundi | 47. Frozen data |
| 8. Potato Flakes | 27. Various Kind of parata | 48. Frozen Karola |
| 9. Potato Chips | 28. Alu puri | 49. Frozen bean seed |
| 10. Aromatic and fine rice | 29. Dal-puri | 50. Frozen jackfruit seed |
| 11. Flattened and puffed rice | 30. Vegetable spring role | 51. Frozen satcora |
| 12. Confectionery goods | 31. Singara | 52. Frozen lediesfinger |
| 13. All Kinds of spices | 32. Luchi | 53. Frozen olive |
| 14. Fruit Jam | 33. Dal samusa | 54. Frozen bean |
| 15. Fruit Jelly and marmalade | 34. Vegetable samusa | 55. Frozen potol |
| 16. Pickles of Fruit, vegetables & spices | 35. Chitai pitha | 56. Frozen zhinga |
| 17. Chutney of fruit, vegetables & spices | 36. Candy | 57. Frozen kakrol |
| 18. All Kinds of sauces | 37. Babol gum | 58. Frozen narkeli kachu |
| 19. Semai | 38. Lollipop | 59. Frozen barbati |
| | 39. Syrup of date juice | 60. Frozen radish |
| | 40. Vinagur of date juice | |

ANNEXURE-E

CHEMICAL MEASUREMENTS SERVICE PROVIDERS: PARTIAL LIST OF MAIN
LABORATORIES OF BANGLADESH[Excluding the QC Labs Operational in Industries & the Medical Diagnostic
Laboratories]

Sl. No.	Organization	Name of the Laboratory	Main Techniques
1.	University of Dhaka	Department of Chemistry, Organic Pollutant Research Lab (OPRC)	(1) HPLC-10AT (Shimadzu) (1) HPLC-501 (Waters) (1) GC-MS series II (HP) (1) GC 14A, (1) GC 15A (1) GC-17A with FCD &FTP Detector (Shimadzu) (1) AAS-680, PR-5 (1) IR Spectrometer 470 (Shimadzu) (1) UV-VIS Spectrophotometer (Shimadzu) (1) Voltameter 200-75mV (1) Helium-Neon Laser
2.		Institute of Nutrition and Food Science	(1) HPLC (Waters) (1) UV-VIS Spectrophotometer
3.		Department of Botany	(1) GC, (1) PCR Thermal Cycler
4.		Department of Biochemistry & Molecular biology	(1) PCR Thermal Cycler, (1) ELISA reader and (1) UV-VIS Spectrophotometer
5.		Department of Soil & Environmental Sciences	(1) AAS (VARIAN), (1) UV-VIS Spectrophotometer
6.		Department of Biotechnology & Genetic Engineering	(1) PCR (1) CO2 Incubator
7.		Department of Microbiology	(1) PCR (1) ELISA Reader (1) Microscope (1) Laminar Air Flow (1)Electrophoresis Separation System
8.		Center of Excellence	(1) AAS 800 (Perkin Elmer) both Flame and Graphite Furnace (1) DNA Sequencer ABI 3130 (Applied Biosystem) (1) Laser Spectrophotometer (1) N2 Generator (1) UV-VIS spectrophotometer
9.	Bangladesh University of Engineering & Technology (BUET)	Petroleum and Mineral Resources Engineering Department	(1) Bomb Calorimeter Park 1261 (1) GC 17A (Shimadzu) (1) Graphite Furnace AAS 1100

10.		Chemical Engineering Department	(1) GC (Shimadzu) (1) HPLC (Waters) (1) IR Spectrophotometer (Shimadzu) (1) Environmental Monitor (1) Water Quality Assessment
11.		Department of Metallurgical and Material Science	(1) GC Scanning (1) Electron Microscope (1) X-Ray Diffractometer (1) 500KN Universal Testing Machine
12.		Department of Environmental Engineering	(1) Graphite Furnace AAS (Shimadzu) (1) Air Sampler (Shimadzu)
13.	Department of Public Health Engineering (DPHE)	DPHE Central Laboratory at Dhaka networked with 18 Zonal Laboratories for National Water Quality Monitoring Programme DPHE Central Laboratory (contd.)	(2) AAS 6800 (Shimadzu) (1) Mercury Analyzer RA-3 (1) Microwave Digester (1) Ion Chromatography (Shimadzu) (1) Total Organic Carbon Analyzer(Shimadzu) (1) GC 2010 (Shimadzu) (1) UV-VIS Spectrophotometer 1700 (Shimadzu)
14.	Bangladesh College of Leather Technology (BCLT)	DPHE Central Laboratory at Dhaka networked with 18 Zonal Laboratories for National Water Quality Monitoring Programme DPHE Central Laboratory (contd.)	(1)HP-TLC (1) Scanning Electron Microscope (1) AAS Analyst-300 (1) GC-MS (1) FTIR Spectrophotometer (1) UV-VIS Spectrophotometer
15.	Department of Livestock Services	Proximate Section	(1) HPLC (Knaure, Germany) (1) AAS Spectra-220 (Varian) (1) UV-VIS Spectrophotometer (2) Kjeldahl Equipment (4) Fat Analysis Systems
16.	Department of Shipping		(1) GC (Shimadzu) (1) AAS (Shimadzu) (1) UV-VIS Spectrophotometer
17.	Department of Agricultural Extension	Pesticide Laboratory	(1) GLC GC-14B (Shimadzu) (1) HPLC SCL 10A (Shimadzu) (1) UV-VIS Spectrophotometer
18.	Bangladesh Atomic Energy Commission (BAEC)	Agrochemical & Environmental Research Division, Institute of Food And Radiation Biology	(1) HPLC with UV-VIS, RID, DAD Detectors (Shimadzu) (1) GC-MS(Finnigan-Trace GC Ultra, USA) (1) AAS (AA6300, Shimadzu) (1) ELISA Reader (Anthos 2020, Austria) (1) HPTLC with Documentation System (Desaga) (1) Multi Soxhlet Extractor (2) N2 Generator
19.	Bangladesh Council of Scientific and Industrial Research (BCSIR)	Industrial Microbiology, IFST	(1) Laminar Air Flow (2) Fermenter
20.		Food Toxicology, IFST	(1) HPLC 1200 (Agilent) (1) HPLC 1000 Series (CECIL) (1) GC 148 (Shimadzu) (1) LC-MS/MS (Applied Bioscience ABI)

21.		Food Packaging, IFST	(1) HPLC (1) GC (1) IR Spectrophotometer (1) Vapor Penetration Tester (1) ATP Analyzer (1) Fluorometer (1) AAS (FTIR) Shimadzu (1) Bomb Calorimeter
22.		Institute of Food Science & Technology (Food Enzymology), IFST	(1) HPLC (Waters) (1) Amino Acid Analyzer (1) Capillary Electrophoresis (1) UV-VIS Spectrophotometer
23.		Analytical Research Division	(1) ICP-MS (Varian, Australia) (1) LC-MS (Waters) (1) NMR 400 (Bruker) (1) AAS AA6401 (Shimadzu) (1) AAS Spectra (Varian, Australia) (1) Volta meter (Metrohm 7170) (1) LCMS-MS (Work Order Issued) (1) Sample Digester MW 3000 (Perkin Elmer) (1) UV-VIS Spectrophotometer (Perkin Elmer)
24.		Institute of Glass & Ceramic Research & Testing (IGCRT)	(1) XRD (1) XRF (1) 100 kN UTM (1) Particle Size Analyser Micromeritics (1) Pycnometer Micromeritics (1) Dilatometer (1) Petrographic Microscope
25.	Bangladesh Council of Scientific and Industrial Research (BCSIR)	Instrumentation & Calibration Service Laboratory (ICSL)	(1) FT-NMR (1) ICP-MS (1) EDXRF (1) Flame AAS (1) Graphite Furnace AAS (2) Total Organic Carbon (TOC) Analyzer (1) FT-MIR (1) FT-FIR with Gas Analysis Option (1) FT-NIR (1) UV-VIS Spectrophotometer (1) Automatic Polarimeter (2) HPLC (2) GC (1) GC-MS (1) LC-MS/MS
26.	International Center for Diarrheal Disease and Research (ICDDR,B)	Biochemistry and Nutrition Research Division	(2) HPLC (Waters) (1) AAS (Shimadzu) (1) UV-VIS Spectrophotometer (Shimadzu)
27.		Molecular Biology/ Immunology	(1) PCR (1) ELISA Reader (1) DNA Synthesizer (1) UV-VIS Spectrophotometer (1) Tissue Culture Facilities

28.	Bangladesh Institute of Nuclear Agriculture (BINA)		(1) HPLC SPC-6A (Shimadzu) (1) AAS 2380 (Perkin Elmer) (1) 15N Analyzer (1) Flame Photometer 410 (Sherwood) (1) PCR Eppendorf) (1) UV-VIS Spectrophotometer (CECIL) CE 3041
29.	Bangladesh Fisheries Research Institute (BFRI)	Toxicology	(1) HPLC, D-Star C030 (USA) (1) AAS VGP 210 (Buck Scientific) (1) AAS (Phoenix)
30.		Nutrition Laboratory	(1) Amino Acid Analyzer (1) Lipid Analyzer (1) Bomb Calorimeter (1) Kjelttec 2100 (Foss, Sweden) (1) UV-VIS Spectrophotometer
31.		Microbiology Laboratory	((1) GC (1) Microtome (1) Microscope (1) Auto Tissue Processor (1) Microscope with Documentation System
32.	Soil Resource Development Institute (SRDI)	Microbiology Laboratory	(5) AAS (Heavy Metal Analysis) (11) AAS (Micronutrients) (16) Flame Photometer (4) UV-VIS Spectrophotometer (2) Micro Kjeldahl (1) Carbon Analyzer C200 (USA) (1) Bomb Calorimeter
33.	SGS Bangladesh limited	Textile Chemistry	(1) ICP-OES (VISTA MPX) (1) GC-MS (1) GC-FID, ECD, (1) HPLC (1) ELISA Reader (1) Multiwave Reaction System
34.	Plasma Plus	Chemical & Environmental Science	(1) Flame AAS AA 6601 (Shimadzu) (1) Graphite furnace GFAA 6650 (1) HPLC (Shimadzu) (2) HPLC (LC-10 AD) (1) GC (GC 8A Shimadzu) (1) GC (200 series, Shimadzu) (1) FTIR (Shimadzu) (1) Total Organic Carbon Analyzer (TOC-VCSH)
35.	Stamford University Bangladesh	Dept. of Pharmacy	(1) HPLC
36.	University of Asia Pacific	Faculty of Pharmacy	(1) HPTLC (1) HPLC (1) UV-VIS Spectroscopy (1) Dissolution Testing (1) Friability Testing
37.	Southeast University	Faculty of Pharmacy	(1) UV-VIS Spectroscopy

38.	East West University	Faculty of Pharmacy	(1) Laminar Flow Workstation (1) Incubator (1) Gel-Electrophoresis (1) Dissolution Testing (1) Friability Testing
39.	Bangladesh Standards & Testing Institution (BSTI)	Chemical Testing Wing	(1) UV-VIS Spectroscopy (1) GC (Shimadzu) (1) GC-MS (1) HPLC (1) AAS (Flame & Graphite) (1) Laminar Flow Workstation (1) Incubator
40.	Bangladesh Agricultural Research Institute (BARI)	Entomology Department	(1) GC (Shimadzu) (1) GC-MS (1) HPLC
41.		Plant Breeding/ Biotechnology	(2) PCR Techne & Eppendorf (1) DNA Sequencer (ABI 3130) Applied Biosystems (1) Amino Acid Analyzer (Shimadzu)
42.		Soil Science	(1) Flame Photometer (Jenway) (1) Kjetelec 2300 (Foss) (2) AAS (Perkin Elmer & Buck Scientific)
43.		Horticulture	(1) ICP-MS (1) GC-MS
44.	Institute of Public Health (IPH)	Drug Testing Laboratory	(1) HPLC (Waters) (1) AAS (Chemtech) (1) GC (HP) (1) IR Spectrophotometer (Buck)
45.		Public Health Laboratory	(1) HPLC (Agilent) (1) AAS (Agilent) (1) GC (Agilent)
46.	Bangladesh Rice Research Institute (BRRI)	Soil Science	(1) HPLC (Shimadzu) (3) AAS (2 Shimadzu & 1 Hitachi) (1) UV-VIS Spectrophotometer (Hitachi)
47.		Grain Quality & Nutrition	(1) Bomb Calorimeter (1) UV-VIS Spectrophotometer (Hitachi)
48.		Plant Pathology	PCR UV-VIS Spectrophotometer
49.	Department of Fisheries (DOF)	Fish Inspection and Quality Control Laboratory, Dhaka	(1) LC MS-MS (1) HPLC, DFL-10 (D-Star) (1) AAS , VGP 210 (Buck Scientific) (1) UV-VIS Spectrophotometer (Hach) (1) Mini API (Hach)
50.		Fish Inspection and Quality Control Laboratory, Chittagong	(1) HPLC, DFL-10 (D-Star) (1) AAS , VGP 210 (Buck Scientific) (1) UV-VIS Spectrophotometer (Hach) (1) Mini API (Hach)

51.		Fish Inspection and Quality Control Laboratory, Khulna	(1) HPLC, DFL-10 (D-Star) (1) AAS , VGP 210 (Buck Scientific) (1) UV-VIS Spectrophotometer (Hach) (1) Mini API (Hach)
52.	Bangladesh Power Development Board	Water Quality, Fuel Testing and Environmental Center	AAS 6650 (Shimadzu)
53.	Department of Environment and pollution control	Dhaka Laboratory	HPLC AAS GC
54.		Khulna Laboratory	AAS UV-VIS Spectrophotometer
55.	Khulna University	Department of Fisheries & marine Resources	PCR Flame Photometer UV-VIS Spectrophotometer
56.		Department of Biotechnology	PCR
57.	Bangladesh Agriculture University (BAU)	Faculty of Fisheries	UV-VIS Spectrophotometer

ANNEXURE-F

REGULATORY CONTROL LIMITS IN FOOD AND DRINKS AS PER BANGLADESH PURE FOOD ORDINANCE 1959

(AMENDMENT 2005) & PURE FOOD RULES 1967

Sl. No.	Matrix	Limits & unit
001	Cow milk	Fat (%) : >3.5 Solid other than Fat (%) : >8.5 Specific gravity : 1028:1032 at 15.5°C Lactose (%) : >4.4
002	Buffalo milk	Fat (%) : >6.0 Solid other than Fat (%) : >9.0 Specific gravity : 1028:1032 at 15.5°C Lactose (%) : >4.4
003	Milk or mixed milk (Cow and buffalo)	Fat (%) : >3.5 Solid other than Fat (%) : >8.5 Specific gravity : 1028:1032 at 15.5°C Lactose (%) : >4.4
004	Skimmed milk	Fat (%) : 3.0 Solid other than Fat (%) : >9.0
005	Condensed milk, full cream (Sweetened)	Fat (%) : >9.0 Solid with Milk Fat (%) : >31.0 Sucrose (%) : >40.0
006	Condensed milk, full cream (Unsweetened)	Fat (%) : >9.0 Solid with Milk Fat (%) : >31.0
007	Condensed milk, skimmed (Sweetened)	Solid with Milk Fat (%) : >26.0 Sucrose (%) : >40.0
008	Condensed milk, skimmed (unsweetened)	Solid with Milk Fat (%) : >20.0
009	Sterilized milk	Fat (%) : >3.5 Solid other than Fat (%) : >8.5 Specific gravity : 1028:1032 at 15.5°C Lactose (%) : >4.4
010	Desiccated milk or dried milk powder	Fat (%) : >26.0 Solid with Milk Fat (%) : >96.0 Water (moisture) % : 4.0 Ash % : 7.0 Lactic acid : 1.0
011.0	Dried skimmed milk	Solid with Milk Fat (%) : >95.8 Water (moisture) % : 4.2 Ash % : 9.0 Lactic acid : 1.0
011.1	Non fat dried milk solids	Solid with Milk Fat (%) : >95.8 Water (moisture) % : 4.2 Ash % : 9.0 Lactic acid : 1.0
011.2	Skimmed milk powder	Solid with Milk Fat (%) : >95.8 Water (moisture) % : 4.2 Ash % : 9.0 Lactic acid : 1.0

012	Cow ghee	Butyro-Refractometer Reading : 40:43 at 40°C Reichert Wollny : >24 Free fatty acids : >2.0 Polenske : >2.8 Saponification : >220 Baudouin : -ve
013	Buffalo ghee	Butyro-Refractometer Reading : 40:43 at 40°C Reichert Wollny : >30 Free fatty acids : >2.0 Polenske : >2.8 Saponification : >220 Baudouin : -ve
014	Mixed ghee	Butyro-Refractometer Reading : 40:43.5 at 40°C Reichert Wollny : >26 Free fatty acids : >2.0 Polenske : >2.8 Saponification : 220-222 Baudouin : -ve
015	Butter	Fat (%) : >80.0 Water (moisture) % : >18
016	Cream or Malai	Fat (%) : >40.0
017	Mawa or Khoa	Fat (%) : >20 Water (moisture) % : >30
018.0	Sandesh, Khir, Rasogolla	Fat (%) : >10
018.1	Barfi, Para, Kalakand	Fat (%) : >10
019.0	Dahi or curd (from cow milk)	Fat (%) : >3.5 Solid other than Fat (%) : >9.0
019.1	Dahi or curd (from buffalo milk)	Fat (%) : >6.0 Solid other than Fat (%) : >9.0
020	Cheese	Fat (%) : >30
021	Skimmed milk dahi	Fat (%) : >3.0 Solid other than Fat (%) : >9.0
022	Chhana	Fat (%) : >10
023.0	Ice-cream, Fruit Ice-cream	Fat (%) : >10 Solid other than Fat (%) : >36.0
023.1	Malai Baraf and Kulfi Baraf	Fat (%) : >10 Solid other than Fat (%) : >36.0
024	Tonned Milk	Fat (%) : >3.0 Solid other than Fat (%) : >9.0
025	Mustard oil (Sarisar tel)	Butyro-Refractometer : 58.5-60.5 at 40°C Free fatty acids : >1.25 Iodine value : 169.0-176.0 Saponification : 96.0-108.0
026	Cotton seed oil	Free fatty acids : >0.5 Saponification : 190-198 Iodine value : 103.0-115.0 B.R. Reading : 58-59 at 40°C Non-Saponifiable matter : >1.5

027	Ground nut oil (Badam tel)	Butyro-Refractometer Reading : 55-57 at 40°C Free fatty acids : >2.0 Saponification : 188-195 Iodine value : 84.0-98.0 Non-Saponifiable matter : >1.0
028	Sesamo oil (Til tel)	Butyro-Refractometer Reading : 58-61 at 40°C Free fatty acids : >2.0 Saponification : 188-193 Iodine value : 105.0-115.0 Non-Saponifiable matter : >1.5
029	Olive oil	Butyro-Refractometer : 53-56 at 40°C Free fatty acids : >2.0 Saponification : 185-196 Iodine value : 79.0-90.0 Non-Saponifiable matter : >1.5
030	Poppy seed oil	Butyro-Refractometer : 54-60 at 40°C Free fatty acids : >2.0 Saponification : 192-196 Iodine value : 133.0-143.0 Non-Saponifiable matter : >1.0
031	Cocoonut oil (Narikel tel)	Butyro-Refractometer : 33.5-35.5 at 40°C Free fatty acids : >2.0 Polenske : >13 Saponification : 255-260 Iodine value : 7.5-9.5
032	Almond Oil	Butyro-Refractometer : 54.5-58.6 at 40°C Free fatty acids : 3.00% Saponification : 188-196 Specific tests : -ve
033	Soyabean Oil	Water (moisture) : 0.10%
		Butyro-Refractometer : 62.5-64 Free fatty acids : 2.00% Saponification : 190-194 Iodine value : 130-147 Non-Saponifiable : 1.5%
034	Banaspati	
035	Margarine	Fat (%) : 10-80 Water (moisture) : 16% Melting point of fat : (33-37)°C Sesame oil % : 5 Vitamin A : 15,000
036.0	Tea (Black Tea)	Ash % : 4-8 Crude Fiber % : >45 Aqueous extract % : >33 Cafeine : Positive
036.1	Tea (Green Tea)	Ash % : 4-8 Crude Fiber % : >45 Aqueous extract % : >33 Cafeine : Positive
037	Coffee	Artificial coloring : Negative Flavouring matters : Negative

038	Roasted Coffee	Ash % : 3-5 Aqueous extract % : 15-32 Caffeine : >1.2% Alkalinity of ash per gram (N/10acid) : (3.4-4.4)ml
039	Ground Coffee	
040	Refine Sugar	Sucrose % : 99.8 Water (moisture) : 0.05% Ash % : 0.1
041	Desi Sugar	Sucrose % : 96.5 Water (moisture) : 1.50% Ash % : 0.7
042	Gur (Sugarcane)	Sucrose % : >80 Ash % : 6.0 Sugars% : >90 Matters insoluble% : 1.5 Ash insoluble inhydrochloric acid : 0.50%
043	Gur (Khejur)	Ash % : 2.5 Sugars% : >90 Matters insoluble% : 1
044	Honey	Sucrose % : 10 Water (moisture) : 25% Ash % : 0.5 Sugars% : >60 Fiehe's test : Negative
045	Liquid Glucose	Refractive index : 1.490 at 20°C Arsenic (Parts per million) : 2 Lead(Parts per million) : 2 Acidity in 5 grams (of N/10 alkali) : 0.6 Sulphur dioxide(Parts per million) : 450 Sulphated ash% : 0.6
046	Batasa	Ash % : 0.7 Dye : Negative
047	Food grains	Water (moisture) : <13% Foreign matter % : <3 Damaged grain % : <10 Sound grain % : >85 Insect (Damaged grain) % : <5
048	Atta	Water (moisture) : <13% Ash % : <2 Acidity % : <0.35 Gluten % : >8
049	Wheat flour or maida	Water (moisture) : <13% Ash % : <0.7 Acidity % : <0.35 Gluten % : >8
050	Suji	Water (moisture) : <13% Ash % : <1 Acid insoluble Ash% : <0.05 Acidity % : <0.35 Gluten % : >7.5
051	Corn flour	Water (moisture) : <13% Ash % : <0.7 Lactic acid : <0.35

052	Basan, Vasan	Ash % : <3.0 Lactic acid : <0.50
053	Vermicelli or SemaI	Water (moisture) : <13% Ash % : <1.0 Protein% : >8 Acid insoluble Ash% : <0.05 Acidity % : <0.35
054	Arrowroot	
055	Sago or Sagudana	Water (moisture) : <12% Ash % : <0.2 Carbohydrates % : >87
056	Shoti or Shoti food	Water (moisture) : <15% Ash % : <1.0 Acid insoluble Ash% : <0.2
057	Acrated water	Phosphoric acid : <0.1 pH : 7.0-8.3 Total hardness (parts per 100000) : <25 Chloride : <6 Free ammoniacal nitrogen (parts per 100000) : <0.005 Albuminoid ammoniacal nitrogen (parts per 100000) : <0.005 Oxygen absorbed (parts per 100000) : <0.1 Nitrates as Nitrogen (parts per 100000) : <0.005 Sulphate (parts per 100000) : <4 Iron (parts per 100000) : <0.03
058	Soda water	Water (moisture) : <15% Ash % : <1.0 Acid insoluble Ash% : <0.2
059	Haldi or Turmerie	Water (moisture) : <10% Ash % : <9.0 Acid insoluble Ash% : <1.5
060	Zeera, Siah Zeera or Cumin	Ash % : <9.5 Acid insoluble Ash% : <1.5 Harmless foreign matter : <5
061	Dhania or Coriander	Ash % : <9.0 Acid insoluble Ash% : <1.5 Harmless foreign matter : <5
062	Jwain	Ash % : <9.0 Acid insoluble Ash% : <1.5 Harmless foreign matter : <5
063	Marich, Lal Marich or Chillies	Ash % : <8.5 Butyro-Refractometer Reading : >69 at 40° C Acid insoluble Ash% : <1.5 Non-volatile Ether Extract % : >12
064	Gole marich; Pepper or Black Pepper	Ash % : <7.0 Acid insoluble Ash% : <1.0 Non-volatile Ether Extract % : >7 Foreign Organic matter % : <2 Starch % : >30
065	Methi or Fenugreek	Water (moisture) : <10% Ash % : <7.0 Acid insoluble Ash% : <2.0 Harmless foreign matter : <5 Soluble in water : >30

066	Jaifal or Nutmeg	Ash % : <5.0 Acid insoluble Ash% : <0.5 Non-volatile Ether Extract % : >25
067	Jatri or Mace	Ash % : <3.0 Non-volatile Ether Extract % : 20-30 Crude fibre : >10
068	Dar Chini or Cinnamon	Ash % : <8.0 Acid insoluble Ash% : <2.0 Volatile essential oil : >2.0
069	Labanga or Cloves	Ash % : <10 Acid insoluble Ash% : <0.75 Foreign Organic matter % : <1.0
070	Ginger	Ash % : <7.0 Starch % : >1.7
071	Choto Ilachi or Cardamom	Ash % : <6.0 Acid insoluble Ash% : <3.0
072	Baro Ilachi or Greater domom	Ash % : <8.0 Acid insoluble Ash% : <3.0 Volatile essential oil : >1.0
073	Mouri or Aniseed	Ash % : <9.0 Acid insoluble Ash% : <1.5 Harmless foreign matter : <5 Volatile essential oil : >2.0
074	Zafran or Saffron	Ash % : <7.5 Acid insoluble Ash% : <1.0
075	Poppy Seed	Ash % : <8.0 Harmless foreign matter : <5 Oil % : >40
076	Curry powder	Ash % : <9.0 Acid insoluble Ash% : <1.5
077	Garom Masala	Ash % : <9.0 Acid insoluble Ash% : <1.5
078.0	Fruit Juice (lemon juice)	Citric acid % : >4
078.1	Fruit Juice (lime juice)	Citric acid % : >5
078.2	Fruit Juice (Other than lemon or lime juice)	Citric acid % : >3.5
079	Tomato Juice	Total Solid % : >5
080	Fruit Syrup	Total Soluble Solid % : >65
081	Fruit Squash	Citric acid % : >4 Total Soluble Solid % : 30-50
082	Fruit Beverage, Fruit Drink or Fruit Crush (Given any trade name)	Total Soluble Solid % : >10
083	Sirka or Vinegar	Ash % : >0.1 g per 100 ml Total Solid % : >2 g per 100 ml Acetic Acid : >3.75 g per 100 ml
084	Tomato sauce or Tomato Ketchup or Tomato Relish or any other brand conveying the meaning that the product so designated is a form of tomato sauce	Acidity % : >1.2 Total Soluble Solid % : >25
085	Jam	Total Soluble Solid % : >66

086	Fruit Jelly	Total Soluble Solid %	: >66
087	Marmalade	Total Soluble Solid %	: >66
		Preservative Sulphur Dioxide (ppm)	: <40
088	Bottled or Canned Fruit	Concentration (degree brix)	: 17.5
		Drained weight	: >40
089	Bottled or Canned Vegetables	Drained weight	: >50
		Strength of brine	: 1.25-2.50
090	Fruit Chutney	Total Soluble Solid %	: >50
091	Dried or Dehydrated fruits	Water (moisture)	: 15%
092	Fruit and vegetable preserves or morabbas	Soluble solids of the covering syrup %	: 60
		Fruit content %	: >40
093	Pickles	Oleic acid	: 2.80%
		Salt	: 12%
		Citric acid %	: >3
094	Bottled or Canned Meat	Colouring or flavouring substances:	Positive
095	Common Salt (Labon) Dried/Undried	Water (moisture)	: (0.5-4)%
		Matters insoluble%	: 0.2
		NaCl%	: >98
		Calcium %	: 0.3
		Magnesium %	: 0.3
		Sulphate%	: 1
		Carbonate%	: 0.02
		Copper ppm	: 2.5
		Lead ppm	: 5
		Arsenic ppm	: 1.4
		Iron ppm	: 10
096	Baking powder	Carbondioxid(Available) %	: >8
		Carbondioxid (Residual) %	: 1.5
097	Khair or edible catechu	Ash %	: 6.0
		Alcohol soluble extract %	: >60
		Loss on drying at 100 °C	: 15%
098	Edible gelatine	Ash %	: 3.25
099.0	Edible fats (Beef fat)	Saponification	: 193-200
		Iodine	: 35-46
099.1	Edible fats (Mutton fat)	Saponification	: 192-195
		Iodine	: 35-46
099.2	Edible fats(Goat fat)	Saponification	: 193-196
		Iodine	: 35-46
099.3	Edible fats(Pig fat)	Saponification	: 192-198
		Iodine	: 53-65
100.0	Biscuits (Arrowroot)	Fat %	: >5
		Water (moisture) %	: <5.0
		Acid insoluble Ash%	: <0.05
		Acidity %	: <1.0
		Cereal %	: 5
100.1	Biscuits (Barley)	Fat %	: >5
		Water (moisture) %	: <5.0
		Acid insoluble Ash%	: <0.05
		Acidity %	: <1.0
		Cereal %	: 5

100.2	Biscuits (Butter)	Fat % : >5 Water (moisture) % : <+5.0 Acid insoluble Ash% : <-0.05 Acidity % : <+1.0
100.3	Biscuits (Corn flour)	Fat % : >5 Water (moisture) % : <+5.0 Acid insoluble Ash% : <-0.05 Acidity % : <+1.0 Cereal % : >5
100.4	Biscuits (Glucose)	Fat % : >5 Water (moisture) % : <+5.0 Acid insoluble Ash% : <-0.05 Acidity % : <+1.0 Glucose % : >5
100.5	Biscuits (Honey)	Fat % : >5 Water (moisture) % : <+5.0 Acid insoluble Ash% : <-0.05 Acidity % : <+1.0 Sugar % : >5
100.6	Biscuits (Milk)	Fat % : >5 Lactose % : >5 Water (moisture) % : <+5.0 Acid insoluble Ash% : <-0.05 Acidity % : <+1.0
100.7	Biscuits (Rice)	Fat % : >5 Water (moisture) % : <+5.0 Acid insoluble Ash% : <-0.05 Acidity % : <+1.0 Cereal % : >5
100.8	Biscuits (Soyo)	Fat % : >5 Water (moisture) % : <+5.0 Acid insoluble Ash% : <-0.05 Acidity % : <+1.0 Soyabean % : >+15
100.9	Biscuits (Tapioca)	Fat % : >5 Water (moisture) % : <+5.0 Acid insoluble Ash% : <-0.05 Acidity % : <+1.0 Cereal % : >5
101	Loaf, Bread (White)	Water (moisture) % : <-25.0 pH : <5.3-6.0
102	Lozenges	Sucrose % : >+85 Water (moisture) % : <-3 Acid insoluble Ash% : <-0.1
103	Toffees	Sucrose % : >+40 Water (moisture) % : <-8 Ash % : <-2.5 Acid insoluble Ash% : <-0.1
104	Chocolate	Sucrose % : >+80 Water (moisture) % : <-5.0 Ash % : <-8
105	Dried fish (Unsalted)	Water (moisture) % : <-15.0
106	Dried fish (Salted)	Water (moisture) % : <-15.0 Acid insoluble Ash% : <-2.5 Salt (NaCl) : <-15
107	Ice	pH : <7-8.3 Total hardness (parts per 100000): <-25.00 Chloride (parts per 100000) : <-6.00 Free ammoniacal nitrogen (parts per 100000) : <+0.005 Albuminoid ammoniacal nitrogen (parts per 100000): <-0.005 Oxygen absorbed(parts per 100000) : <-0.10 Nitrates (parts per 100000) : <-0.005 Sulphate (parts per 100000) : <-4.00 Iron (parts per 100000) : <-0.03

ANNEXURE-G

SOME EXAMPLES OF REGULATIONS BY US, EU, CANADA & JAPAN

S/N	Year	Economy	Regulations & Restrictions Enforced in the Economy	TBT/SPS
1	1947	US	Mandated levels and testing requirements for pesticide residues in agricultural products Federal Insecticide, Fungicide and Rodenticide Act (FIFRA, 1947, as amended), the Federal Food, Drug and Cosmetic Act (FFDCA) and associated regulations: 7USC136o, 21USC1401 and 40CFR152-180.	SPS
2		US	Restrictions and labeling requirements for formaldehyde in wood products Toxic Substances Control Act (15USC2601 [findings, policy and intent] and 15USC2612 [entry into customs territory of the United States]) and the Federal Hazardous Substances Act - regulations - USC Title 15 1261.	SPS
3		US	Restrictions on solid wood packaging and material 7CFR 319.40 Restrictions on solid wood packaging material from China - US Entry Requirements longhorn beetle, US7CFR301.	SPS
4		US	Requirements for sampling and testing of food and fisheries products HACCP Systems: Hazard Analysis Critical Control Point.	SPS
5		US	Prescribed energy conservation standards for certain major household appliances Energy Policy and Conservation Act, as amended by the National Energy Conservation Policy Act and the National Appliance Energy Conservation Act and the National Appliance Energy Conservation Amendments.	TBT
6		US	Corporate average fuel economy standards for light trucks Light Truck Average Fuel Economy Standards Model Years 2005-07 49 CFR Part 533.	TBT
7		Japan	Fumigation requirements for horticultural products Plant Quarantine Act.	SPS
8		Japan	Exhaust emissions standards for light and heavyvehicles Safety Regulations for Road Vehicles.	TBT
9		Japan	Requirements for labeling of GM products The Food Sanitation Law.	SPS
10	2002	Canada	Maximum limits on sulfur in diesel fuel Sulphur In Diesel Fuel Regulations (SOR/2002-254).	TBT
11	1999	Canada	Maximum limits on sulfur in gasoline Sulphur in Gasoline Regulations (SOR/99-236), and amendments.	TBT
12		Canada	Mandated emissions standards for on road vehicles and engines On road vehicle and engine emission regulations	TBT
13	2001	EU	Regulations limiting aflatoxin levels in food products Commission Regulation 466/2001 setting maximum levels for certain contaminants in foodstuffs.	SPS
14	2002	EU	Restrictions on azo colourants in textile products Directive 2002/61/EC amending for the nineteenth time Directive 76/769/EEC relating to restrictions on the marketing and use of certain dangerous substances and preparations (azo colorants).	TBT

ANNEXURE-H POLICY MATRIX

Strategic Goal	Objective	Action
<p>4.2.1 Strategic Goal 1: Partnership based Decentralized National Chemical Metrology Infrastructure established and received international recognition in disseminating traceability in chemical measurements</p>	<p>Objectives 1. Legal approximation and development of a National Strategy in the field of metrology in chemistry.</p>	<p>4.2.1.1.1 Ensured government support and consultancy in legal approximation. Legal arrangement will be in favor of the concept that through the line ministries, based on the accreditation status and expertise, GoB will appoint the Designated National Reference Laboratory in specific fields.</p> <p>4.2.1.1.2 Secured advice on institutional design in Metrology for Chemistry in order to reinforce the metrology service from the concerned institute to be appointed as the Designated National Reference Laboratory in the specified field of chemical measurements.</p> <p>4.2.1.1.3 Development and Review of this National Strategy on MIC and developing comprehensive action plans to improve traceability in selected areas (setting priorities).</p> <p>4.2.1.1.4 Conducting the comprehensive Survey on Instrumentation Calibration Needs of Bangladesh as per the Developed Questionnaire (ANNEXURE-B).</p> <p>4.2.1.1.5 Development of a National Database of the Laboratories and making available in the public domain via web hosting.</p> <p>4.2.1.1.6 Evaluation of equipment supply, advice on and recommendation for optimization of necessary equipment.</p> <p>4.2.1.1.7 Allocating national budget to implement the ADP projects when Development Project by the selected national expert institutes through line ministries submitted for developing the reference laboratories in the specified field of chemical measurements. For the year 2010-2021 priority has been identified in food and pharmaceuticals, shrimp and fisheries, water & environment leather & jute, light engineering products, cement and building materials, clinical biochemistry.</p> <p>4.2.1.1.8 Extending Government full support to ensure faster response when Technical Assistance projects are being implemented by UNIDO and other development agencies in developing National Quality Infrastructure (NQI) and metrology infrastructure.</p>

Strategic Goal	Objective	Action
	<p>Objectives 2. Implementation of the National Strategy for Metrology in Chemistry</p>	<p>4.2.1.2.1 Advice on optimization of staffing, quality of services, and funding of institutions, standard and reference laboratories in charge of traceability chain in metrology in chemistry.</p> <p>4.2.1.2.2 Support and facilitate application of quality systems in selected laboratories as per applicable international standards and guides e.g. ISO/IEC17025, ISO/IEC 17034, ISO/IEC 17043, ISO/IEC 15195, ISO/IEC 15189, GLP, CITAC/EURACHEM Guide</p> <p>4.2.1.2.3 Development of concept of establishment of traceability of measurements and determination of measurement uncertainty ranges in selected areas</p> <p>4.2.1.2.4 Establishment of proficiency testing (PT) schemes and preparation and implementation of plans of permanent and periodically inter-laboratory comparison (ILC).</p> <p>4.2.1.2.5 Advice on the need of certified reference materials (CRMs) and possibilities for their domestic production. For the year 2010-2021 priority has been identified in food and pharmaceuticals, shrimp and fisheries, leather & jute, light engineering products, cement and building materials, clinical biochemistry.</p> <p>4.2.1.2.6 Facilitation of training and field trips for the staffs of the reference laboratories and staff training abroad (study tours to the partner national and international institutes involved in the project activities such as NPL India, PTB Germany, NMT Thailand, ITI Sri Lanka etc.).</p> <p>4.2.1.2.7 Evaluation of equipment, staff, and laboratory premises potential network partners, advice and recommendation for further sustainable allocation in the prioritized fields.</p>
	<p>Objectives 3. Strengthened co-operation and communication between all relevant public and private actors</p>	<p>4.2.1.3.1 Advice on improving the co-operation and communication between public administration, market surveillance institutions, research institutions, laboratories, and companies</p> <p>4.2.1.3.2 Information and training on co-operation and communication in Bangladesh of staff of research institutions, private and public laboratories, and responsible public institutions</p> <p>4.2.1.3.3 Development and implementation of study modules and course curricula for university and vocational training institutes to create competent human resources in analytical sciences, laboratory quality management system and Metrology in Chemistry. Establishment of international collaboration with, say, European TrainWIC and other universities.</p> <p>4.2.1.3.4 Information to stakeholders and experts in the legislative process and information to the public through holding awareness workshop, opening and final conference, web based database and information dissemination</p>

Strategic Goal	Objective	Action
	<p>Objectives 4. Effective Partnership based decentralized infrastructure for Metrology in Chemistry is established. Establish effective and appropriate partnership among foreign National Metrology Institutes (NMIs) and Bangladeshi Designated National Reference Laboratories (DNRL) in Chemical Measurements via coordinating designated National Reference Institute of Chemical Metrology (NRICM) in ICSL BCSIR.</p>	<p>4.2.1.4.1 Establishing working relationship and participating regional and international MIC activities with APMP, BIPM, SIM etc. GoB may setup one coordinating designated National Reference Institute of Chemical Metrology (NRICM) in ICSL BCSIR who will initiate communications with APMP, BIPM, CCOQM, SIM etc. and act as the counterpart in Bangladesh in these regional and international Chemical Metrology fora.</p> <p>4.2.1.4.2 Establish bilateral partnership with foreign National Metrology Institutes NMIs (NPL India, PTB Germany, IRMM Belgium, BAM Germany, NPL UK, NIMT Thailand, KRISST Korea, ITI Sri Lanka, NMI Australia, NMI Japan and other Reference Laboratories involved in Metrology in Chemistry activities. Coordinating designated National Reference Institute of Chemical Metrology (NRICM) in ICSL BCSIR may be appointed to framing the action plans through signing Memorandum of Understanding (MoU) and other instruments and to bring all other Designated National Reference Laboratories within this collaborative framework and international cooperation effectively.</p> <p>4.2.1.4.3 Through a coordinating designated National Reference Institute of Chemical Metrology (NRICM) in ICSL BCSIR, all other Designated National Reference Laboratories will establish working relationship with each other and international partners in developing CRMs, Assigning Reference Values (ARVs), participating PT/ILC, Key/Pilot/Supplementary Comparisons.</p> <p>4.2.1.4.4 Establish working relationship among all national-international partners in developing and validating analytical methods, collaborative trials, transferring knowledge through mentoring and training actions.</p>
<p>4.2.1 Strategic Goal 2: National chemical Measurement capacity improved and measurement results reached acceptable quality</p>	<p>Objectives 5. Need based accredited laboratories developed to provide reliable and valid analytical results from chemical measurements</p>	<p>4.2.2.1.1 Conducting the comprehensive Survey on Chemical Analysis & Measurements: The Needs of Bangladesh as per the Developed TOR and Questionnaire (ANNEXURE-A).</p> <p>4.2.2.1.2 Developing planed and comprehensive need based action program and allocate sufficient resources to improve the existing national laboratories (ANNEXURE-F) for accreditation in the priority fields so that the chemical measurements services with recognized and acceptable quality has been made available to the potential clients in industries.</p> <p>4.2.2.1.3 Promotion in setting up accredited laboratories for chemical measurements for through Public Private Partnership. This will increase technical capacity in chemical measurements to meet the growing measurement demands.</p>

ANNEXURE-I ANNEXURE

MINISTRY OF SCIENCE AND INFORMATION
COMMUNICATION TECHNOLOGY
Government of the People's Republic of Bangladesh
Bangladesh Secretariat, Dhaka-1000
Tel: 880-2-8614594,
Fax: 880-2- 8619606

STUDY CONTRACT PROGRAM PROPOSAL
under Special Allocation for Science and Information
&
Communication Technology

(additional Annexures should be submitted wherever necessary)

PART-I: GENERAL INFORMATION

1. NAME AND ADDRESS OF THE CONTRACTING INSTITUTE:

Bangladesh Council of Scientific and Industrial Research
Dr. Qudrat-I-Khuda Road, Dhaka-1205
Phone: 880-2-8620038-9
Fax: 880-2-8613022
E-mail: bcsir@bangla.net

2. DEPARTMENT WHERE RESEARCH IS TO BE PERFORMED:

Instrumentation & Calibration Service Section, Physical Instrumentation Division, BCSIR
Laboratories, Dhaka

3. TITLE OF THE PROPOSED PROJECT:

Formulation of a Draft National Strategy Paper on Developing Chemical Metrology Infrastructure
of Bangladesh.

A. Name of Coordinated Research Programme (if applicable): Not applicable (N/A)

- 1) Name and Designation of the authority of the Organization/Institute/University forwarding
the research contract proposal: Chairman, BCSIR
- 2) Area of Research: Agriculture/Medical Science/Environment Science/Animal
Science/Aquaculture/ Marine Science/Microbial and Industrial/Basic Sciences/Others
(Specify)

4. DURATION (in year) :1 Years

5. TOTAL COSTS (in Taka): Tk. 19, 35, 000.00(Nineteen lac thirty five thousand) only.

PART-II: INFORMATION ABOUT PROJECT PERSONNEL

1 PROJECT PERSONNEL

A. Principal Investigator

NAME	DATE OF BIRTH	SEX : M/F	POSITION HELD (SINCE)
Mala Khan	12 July 1977	F	Scientific Officer (12 June 2006)

Academic Degrees:

B.Sc. Engg (Hons.) in Computer Science & Engineering.

Received The Chancellors Gold Medal award from the Chancellor of the University and the Honorable President of the People's Republic of Bangladesh .

Previous Scientific Experience :

For more than ten (10) years experience in Laboratory Quality Control and conducting R&D in instrumentation, analytical application and laboratory quality management system and in chemical metrology. Specialized in chemical metrology, analytical testing instrumentation (UV-VIS, FTIR, AAS, TOC Analyzer, HPLC, GC, LC-MS, GC-MS, LC-MS/MS), calibration and laboratory information management systems (LIMS) with Laboratory QA/QC as per cGMP/GLP/GALP and ISO17025 with applications in industrial QC, water, environmental, foods and pharmaceuticals QC and scientific research and education. Conducted successful research programs like study on the Quality of Commercially Available Bottled Water in Bangladesh: General Survey Results, Inorganic Physico-chemical Quality and Related Issues. And Implementation of a Laboratory Information Management System (LIMS) for an Environmental Analytical Application and Research Laboratory. As the in-charge of quality control (QA) assisting the laboratory manger on developing and administering water quality monitoring laboratory with comprehensive laboratory QA/QC with applicable GLP requirements.

Publications: more than 12

1. Book: Study on the Quality of Commercially Available Bottled Water in Bangladesh: General Survey Results, Inorganic Physico-chemical Quality and Related Issues, Anwar, KM. M., Khan, M., Prof. Dr. S.Z. Haider (Ediror), Publisher Bangladesh Academy of Sciences, Dhaka, Bangladesh .
2. Report: Study on the Environmental Control System of Vietnam National Metrology Laboratory QUATEST3 Ho Chi Minh City. Report submitted to United Nations Industrial Development Organization (UNIDO) and the Government of the People's Republic of Bangladesh, 20 October 2006.
3. Book: Development of National Chemical Metrology Infrastructure: A Vision for Bangladesh. Anwar, KM. M., Khan, M. Proceedings of the First National Seminar on Development of National

Chemical Metrology Infrastructure of Bangladesh (02 September 2007) jointly organized by Bangladesh Academy of Sciences BAS and PROTIPALOCK Society for Culture & Sciences PSCS. Publisher Bangladesh Academy of Sciences, Dhaka, Bangladesh (in press).

4. Book: Lecture Notes on Modern Instrumental Techniques in Water, Environmental, Pharmaceutical & Biomolecular Analytical Applications: FTIR, HPLC, TOC, AAS & NMR, Anwar, KM. M., Khan, M., The University of Asia Pacific (UAP), November 2005.
5. Book: Implementation of a Laboratory Information Management System (LIMS) for an Environmental Analytical Application and Research Laboratory, Publisher WATER Lab Ltd. (in press).
6. Book: Basic Principles of Laboratory Techniques in Water, Environmental & Pharmaceutical Quality Analysis, Anwar, KM. M., Khan, M., Publisher WATER Lab Ltd. (in press).
7. Scope of Utilizing Rain and Surface Water as Drinking and Agricultural Water Supplement in Bangladesh, Anwar, KM. M., Khan, M., keynote paper presented at the "Seminar-2004 on Safe Water for All" Organized by RONS & JONS Water Research Project at Hotel Sheraton Dhaka, Kazi Nazrul Islam Avenue, Dhaka-1000, Bangladesh, 24 September 2004.
8. Prospect of Interactions between Industries and Academia in Bangladesh, Anwar, KM. M., Khan, M., keynote paper presented at the "Seminar on Pharmaceutical Industries and Pharmacy Education in Bangladesh: Interactions and Prospects", Organized by Southeast University, 24 Kemal Ataturk Avenue, AR Tower (8th Floor), Banani, Dhaka-1213, Bangladesh, 23 July 2004.
9. Commercialized Bottled Water (Part-I -V), Anwar, KM. M., Khan, M., The Daily Bangladesh Today, Vol.01. No.257, No.261, No.264, No.268, No.271 page-5, on 3,7,10,14,17 April 2003.
10. Study on the Quality of Commercially Available Bottled Water in Bangladesh: General Survey Results, Physico-chemical Quality and Related Issues, Anwar, KM. M., Khan, M., keynote paper on a seminar organized by Bangladesh Academy of Sciences and sponsored by University of Science & Technology Chittagong (USTC) at Bangladesh Atomic Energy Center Dhaka, Bangladesh, 2 February 2003.
11. On the watch for lurking danger, Murshid, S., Anwar, KM. M., Khan, M., The Daily Star, Vol. XII No.83, p-9, Dhaka, 12 April, 2002.
12. Water Quality Monitoring: An Overview and Recommendation, Murshid, S., Anwar, KM. M., Khan, M., Invited Paper Presented at the 4th International Conference on Arsenic Contamination of Ground Water in Bangladesh: Cause, Effect & Remedy, Dhaka, 12-13 January, 2002. Jointly Organized by Dhaka Community Hospital and School of Environmental Sciences, Jadavpur University, Kolkata, India. Abstract published in the proceedings of the international conference, Dhaka, Bangladesh, 2003.

B. Associate Investigator :

NAME	DATE OF BIRTH	SEX : M/F	POSITION HELD (SINCE)
Dr. M. Akram Hossain	01 July 1952	Male	Member (S&T) BCSIR (2006)

Academic Degrees :

Ph. D. in Engg. from Indian Institute of Technology (I.I.T.) Kharagpur, India on fluid flow and heat transfer in 1993.

Previous Scientific Experience :

More than thirty years including nine years service in BCSIR. No. of Patent : 2 (two) ; No. of Processes : 21.

Publications:

- Hossain, A. and Brahma. R. K.; Experimental Investigation of Fluid Flow and Heat Transfer characteristics of a slot jet impingement on a square Cylinder, *Warme-und Stoffubertragung*, Germany, V. 28 (1993) 433-439
- Hossain, A. and Brahma, R. K.; Experimental Investigation of Fluid Flow and Heat Transfer characteristics of a slot jet impingement on a square Cylinder, *Warme-und Stoffubertragung*, Germany, V. 28 (1993) 381-386
- Das. D. K. and Hossain, A.; Secondary Current in a Two-dimensional Shear Flow, *Mechanical Engg. Research Bulletin BUET, Dhaka, Bangladesh*, Vol. 7 No. 1 (1984).
- Hossain, A. and Brahma. R. K.; Experimental Investigation of Pressure distribution by jet impingement on a rectangular Cylinder, *Proc. 36th ISTAM (Indian Society of Theoretical and Applied Mechanics) Congress, Bombay, India (1991)*.
- Brahma. R. K and Hossain, A.; ; Experimental Investigation of the flow due to jet impingement on rectangular Cylinder, *Proc. 19th National Conf. Fluid Mech. and Fluid Power, Bombay, India (1992)*.
- Hossain, A. and Brahma. R. K. ; Jet impingement heat transfer from a bluff body. *Proc. Vortices and Heat Transfer, Eurotherm 31, Bochum, Germany (1993)*.
- Hossain, M. A. and Brahma. R. K.; Heat Transfer characteristics due to slot jet impingement on a square cylinder, *Proc. Seminar on Fluid Mechanics Research, Dhaka, Bangladesh, Dec. (1995)*.
- Hossain, M. A. ; Pilot Plant Study of Some R&D Activities of BCSIR, Presented at the SAARC Workshop on Successful Commercialization of R&D Results, 29-30 Sept. 1996, Dhaka, Bangladesh.

9. Hossain, M. A. ; Role of Pilot Plants in Process Development, Proc. 19th Bangladesh Science Conference (BAAS), Oct. 29-31, 1996 Dhaka, Bangladesh.
10. Sharmin, N., Kamruzzaman, S. and Hossain, A. ; Pilot Plant study of Production of Gelatin from Slaughter House Wastes, Proc. Third Annual Paper Meet, 31 Oct. - 02 Nov. , 1996. The Institution of Engineers, Dhaka, Bangladesh.
11. Raihan, M. A. and Hossain, A. ; Problems of Commercialization of a Process from Laboratory Scale Development Proc. Third Annual Paper Meet, 31 Oct. - 02 Nov. , 1996. The Institution of Engineers, Dhaka, Bangladesh.
12. Hossain, A. and Brahma, R. K. ; Pressure distribution by jet impingement on a square cylinder, Proc. Seminar on Fluid Mechanics and Heat Transfer, Dhaka, Bangladesh, Dec. (1997) 213-218
13. Hossain, A ; Commercialization of R&D results, Proc. 20th Bangladesh Science Conference (BAAS), 28-30 Nov. '98 Dhaka, Bangladesh.
14. Hossain, A. Karim R. and Farhana, N. ; Process Development and Pilot Plant study for the Production of Epoxidized Soybean Oil. Proc. Intl. Conf. on Manufacturing, ICM 2000, 24-26 Feb. 2000, BUET, Dhaka, 439-449
15. Parvez, A, Azad, A. K, Afroz, N and Hossain, A. ; Application of high basic chrome in leather processing, Proc. Conf of South and Southeast Asian countries on Leather and Allied Technologies, 4-5, March, 2001 Kolkata, India.
16. Hossain, A., Karim, M.R. and Ahmed, F. N. ; Study on the Production of Carboxymethyl Cellulose on Pilot Scale, Proc. Intl. Conference on Chemical Engineering 2003, 29-30 Dec. 2003, BUET, Dhaka.
17. Hossain, A., Kamruzzaman, S and Sharmin, N. ; Pilot Plant Study for the Stabilization of Rice Bran, Proc. Intl. Conference on Chemical Engineering 2003, 29-30 Dec. 2003, BUET, Dhaka.
18. Gafur, M. A., Hasan, M. N. and Hossain, A. ; National Fibre-polymer (JUTE-LDPE) matrix composites its fabrication, process parameters and properties, Proc. the 3rd Intl. Conference of Mechanical Engineers and 8th Annual Paper Meet on E-manufacturing, The Institution of Engineers, Bangladesh, Mechanical Engg. Division, 20-22 March, 2003, 163-167
19. Hossain, A. and Kazi, A. I. ; Economics of Arsenic Removal from ground water : Bangladesh Perspective, Proc. Intl. Conference on Economic Incentives and Water demand Management, 19-22 March, 2006, Muscat, Oman.
20. Hossain, M. A., Amiri, A.S., Morsheda, E. and Kazi, A. I. ; Preliminary results from Environment Technology Verification - Arsenic Mitigation (ETV-AM) project, Proc. Intl. Workshop on Arsenic Pollution and Clean Water, 11-13 Dec. 2005, held at BAEC, Dhaka.

C. Associate Investigator-II

NAME	DATE OF BIRTH	SEX : M/F	POSITION HELD (SINCE)
KM Mostafa Anwar	02 Dec. 1967	Male	National Project Coordinator, UNIDO (2006)

Academic Degrees: M.Sc. in Physics

Previous Scientific Experience:

For more than seventeen (17) years performing in the area of conformity assessment . Presently providing expert services and technical inputs on developing national conformity assessment system infrastructure: Standards, Quality, Accreditation and Metrology (SQAM). Skilled in providing scientific and technical services in the area of water quality monitoring instrumentation and applications. As the in-charge of quality assurance (QA) and the laboratory manager contribute in developing and administering water quality monitoring laboratory with comprehensive laboratory QAQC with applicable GLP requirements.

Publications: more than 40

(Please provide a complete list of publications in refereed international as well as national journals)

1. WTO Agreements on Technical Barriers to Trade TBT and Sanitary & Phytosanitary SPS Measures: Adoption and Harmonization of International Standards. Anwar, KM. M. Proceedings of the National Workshop on Food Standardization 2007, Jointly Organized by World Health Organization WHO & Institute of Public Health IPH, Dhaka, Bangladesh, October 2007.
2. Book: Development of National Chemical Metrology Infrastructure: A Vision for Bangladesh. Anwar, KM. M., Khan, M. Proceedings of the First National Seminar on Development of National Chemical Metrology Infrastructure of Bangladesh (02 September 2007) jointly organized by Bangladesh Academy of Sciences BAS and PROTIPAALOCK Society for Culture & Sciences PSCS. Publisher Bangladesh Academy of Sciences, Dhaka, Bangladesh (in press).
3. Accreditation & National Systems for Conformity Assessment: A Vision for Bangladesh, Anwar, KM. M. Quarterly News Letter 2. Published by Bangladesh Quality Support Programme BQSP, Funded by European Union, United Nations Industrial Development Organization (UNIDO), NORAD, ITC and Government of the People's Republic of Bangladesh, January 2007.
4. Validation of Methods in Chemical and Microbiological Analyses as per ISO, CODEX, AOAC, IUPAC, ICH. Anwar, KM. M. Proceedings of the Workshop on Method Validation, Jointly Organized by Bangladesh Quality Support Programme BQSP, European Union-United Nations Industrial Development Organization (UNIDO) and Government of the People's Republic of Bangladesh, November 2006.
5. Book: Study on the Quality of Commercially Available Bottled Water in Bangladesh: General Survey Results, Inorganic Physico-chemical Quality and Related Issues, Anwar, KM. M., Khan, M., Prof. Dr. S.Z. Haider (Editor), Publisher Bangladesh Academy of Sciences, Dhaka, Bangladesh.

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7. Book: Implementation of a Laboratory Information Management System (LIMS) for an Environmental Analytical Application and Research Laboratory, Publisher WATER Lab Ltd
8. Book: Basic Principles of Laboratory Techniques in Water, Environmental & Pharmaceutical Quality Analysis, Anwar, KM. M., Khan, M., Publisher WATER Lab Ltd. (in press).
9. Scope of Utilizing Rain and Surface Water as Drinking and Agricultural Water Supplement in Bangladesh, Anwar, KM. M., Khan, M., keynote paper presented at the "Seminar-2004 on Safe Water for All" Organized by RONS & JONS Water Research Project at Hotel Sheraton Dhaka, Kazi Nazrul Islam Avenue, Dhaka-1000, Bangladesh, 24 September 2004.
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11. Report: A Comprehensive Report on Clinical Application of Shimadzu UV-VIS Spectroscopy Systems at Three Different Hospitals in Yangon, Myanmar, Internal Report Submitted to Shimadzu Corporation, Kyoto, Japan, 17 November, 2003.
12. Commercialized Bottled Water (Part-I -V), Anwar, KM. M., Khan, M., The Daily Bangladesh Today, Vol. 01. No. 257, No.261, No. 264, No. 268, No. 271 page-5, on 3,7,10,14,17 April 2003.
13. Study on the Quality of Commercially Available Bottled Water in Bangladesh: General Survey Results, Physico-chemical Quality and Related Issues, Anwar, KM. M., Khan, M., keynote paper on a seminar organized by Bangladesh Academy of Sciences and sponsored by University of Science & Technology Chittagong (USTC) at Bangladesh Atomic Energy Center Dhaka, Bangladesh, 2 February 2003.
14. Water Quality Monitoring: An Overview and Recommendation, Murshid, S., Anwar, KM. M., Khan, M., Invited Paper Presented at the 4th International Conference on Arsenic Contamination of Ground Water in Bangladesh: Cause, Effect & Remedy, Dhaka, 12-13 January, 2002. Jointly Organized by Dhaka Community Hospital and School of Environmental Sciences, Jadavpur University, Kolkata, India. Abstract published in the proceedings of the international conference, Dhaka, Bangladesh, 2003.

PART-III: TECHNICAL INFORMATION

1. SCIENTIFIC BACKGROUND OF THE PROJECT:

A. Significance of the proposed research:

The creation of a national infrastructure to ensure that a nation's chemical measurement results are fit-for-their-intended-purposes has been recognized as an essential element in the modern world of a global economy and trading environment. Usually the reasons for the existence of a chemical measurement infrastructure and the expected deliverables from it will relate to one or more of the following areas:

■ National welfare of the people:

- Reliable and efficient health services;
- Effective environmental management/protection;
- Effective implementation of the law;
- Consumer protection;
- Food safety.

■ National economic performance

- Ensuring quality of exports, and facilitating trade;
- Efficiency of industrial production, more effective process control;
- Support of innovation and industrial development;
- Surveillance of the quality of imported goods.

In this era of fierce competition and technology, standards and technical regulations are playing vital roles to protect the interest of consumers of domestic as well as foreign markets. The obstacle arises from the fact that the developing countries like Bangladesh do not have the necessary Standards, Quality, Accreditation, Metrology (SQAM) called conformity assessment infrastructure to effectively satisfy the requirements of the WTO TBT/SPS agreements. Lack of traceable chemical measurement as well as calibration capacity in chemical testing arena with acceptable level of accuracy, precision and reliability has been identified as a major Technical Barriers to Trade (TBT) for trading under WTO regime.

Essentially the national chemical metrology infrastructure pyramid consists of chemical calibration laboratories at different levels: at the top Primary (Level 1) /National (Level 2) system traceable to SI Units, Reference (level 3), Secondary (Level 4) and Working Standard (User) Laboratories at the bottom. Thus, in addition to the appropriate legal and accreditation arrangement, technical arrangement for chemical measurements should provide infrastructure for calibrating chemical measuring instruments and validating methods to produce testing results with stated, traceable uncertainty. This will in turn contribute developing the countrywide conformity assessment infrastructure so as to achieving precision manufacture and quality assurance.

But unfortunately, in Bangladesh there is no established national technical arrangement for chemical metrology traceable to SI Units to be accepted by the recognized international

communities. Until to date no national (private or public) accredited chemical calibration laboratory or reference laboratory established in the country to meet the international requirements to have traceability. Prior to develop this essential and viable national infrastructure in chemical measurement it has been envisioned that a systematic approach should be followed as depicted in the flow diagram below (Fig 1).

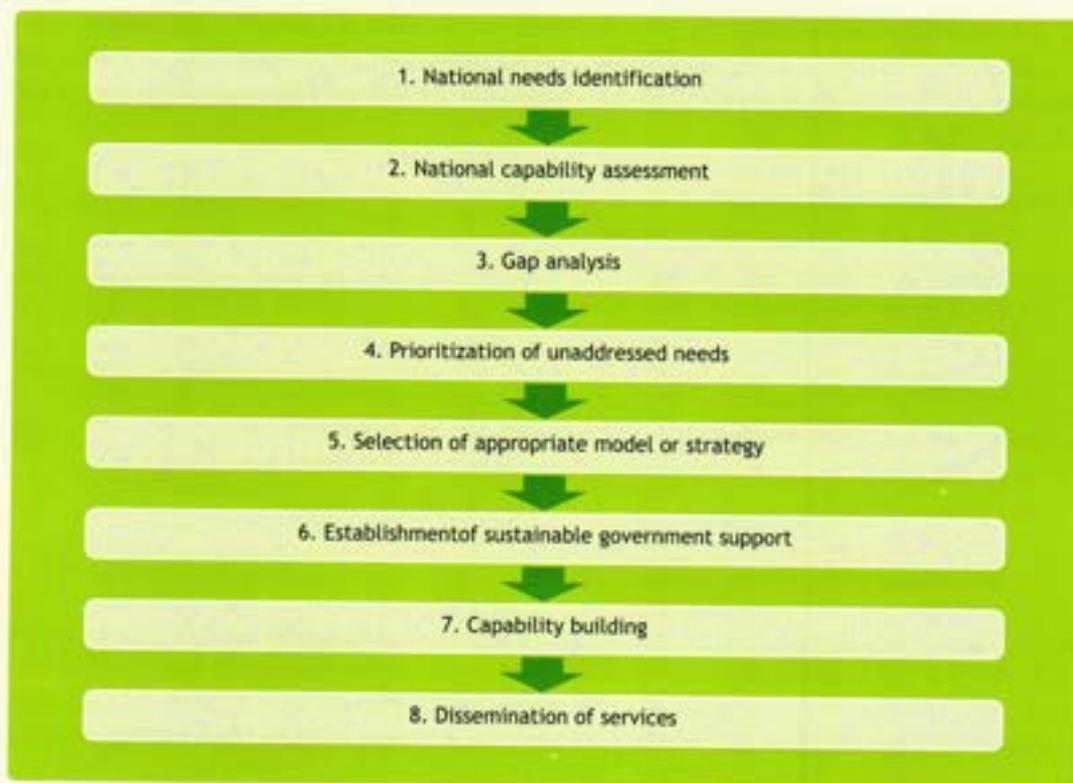


Fig 1: Implementation Steps of Developing a National Chemical Metrology Infrastructure (APMP 2006)

Under this project the activities from Step 1 to Step 5 would be implemented to accumulate a detailed understanding and to prepare a comprehensive national guidance document called "Draft National Strategy Paper on Developing Chemical Metrology Infrastructure of Bangladesh". This document would serve as a national document for future promotion through the respective private - public institutions.

B. Related work already performed or in progress at the contracting institution/organization.

Country's first calibration laboratory for chemical measurement is proposed from BCSIR under the Ministry of Science and Information & Communication Technology MOSICT. The DPP submitted to MOSICT for appraisal on Development of ISO/IEC 17025 Accredited Instrumentation and Calibration Service Laboratory in BCSIR

C. Related work already performed or in progress at other institutes in the country (If known)

This is the first attempt in the country to conduct this kind of study.

D. References to important related literature relevant to the project

1. Principles for the establishment of hierarchy schemes for measuring instruments, International Document OIML D5 Edition 1982 (E).
2. A Guide to Creating or Improving a National Infrastructure for Chemical Measurement, Asia-Pacific Metrology Programme APMP, December, 2006.
3. ILAC Guidance Document ILAC-G2:1994 Traceability of Measurement, International Laboratory Accreditation Cooperation ILAC, 1994.
4. VIML International Vocabulary of Terms in Legal Metrology Vocabulaire International des Termes de Métrologie Légale, EDITION 2000, OIML Secretariat BUREAU INTERNATIONAL DE MÉTROLOGIE LÉGALE (BIML) 11, RUE TURGOT - 75009 PARIS - FRANCE.
5. VIM International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM) 3rd edition. Final draft 2006-08-01 Vocabulaire international de métrologie - Concepts fondamentaux et généraux et termes associés (VIM) 3e édition, Projet final 2006-08-01.
6. Road Map for Quality: Guidelines for the Review of the Standardization, Quality Management, Accreditation and Metrology (SQAM) Infrastructure at National Level, International Trade Centre. ITC, Palais des Nations, 1211 Geneva 10, Switzerland. F-09.03.02 (2004).
7. Metrology - in short 2nd edition, Preben Howarth and Fiona Redgrave, EUROMET project 673, December 2003. Participants: BNM France, CMI Czech Republic, CSIRO NML Australia, CSIR NML South Africa, DFM Denmark, EOTC, EUROLAB, IRMM European Commission, JV Norway, MIRS Slovenia, NIST USA, NMI-VSL the Netherlands, NPL United Kingdom, NRC Canada, PTB Germany, SMU Slovakia, SP Sweden.
8. Legal Metrology, Rocío M. Marbán & Julio A. Pellecer C., 2001 Producción y Servicios Incorporados S.A. Calzada Mateo Flores 5-55, Zona 3 de Mixco, Guatemala, Centro América, Tel.: (502)431-0662 Fax: (502)434-0692, email: psi2001@itelgua.com, Published jointly by the Inter American Metrology System, SIM (Sistema Interamericano de Metrología, Normalización, Acreditación y Calidad) and the Physikalisch-Technische Bundesanstalt, PTB, Germany. ISBN: 99922-770-3-3 ©OEA 2003.
9. Importance of Valid Analytical Measurements, VAM, LGC Limited, London, UK, 2006.
10. The Standards of Weights and Measures Ordinance, 1982 (Ordinance No. XII of 1982), Dacca, the 26th June 1982.
11. The Bangladesh Gazette Extraordinary, NO.S.R.O.223-L/82, NO.S.R.O.224-L/82, NO.S.R.O.225-L/82, Dacca, the 29th June 1982.
12. The Standards of Weights and Measures (Amendment) Act, 2001, Dhaka the 1st Feb.2001.

13. The Bangladesh Gazette Extraordinary, (Published on September 27, 1982) NO.S.R.O.327-L/82, Dacca, the 11th September, 1982.
14. The Bangladesh Gazette Extraordinary (Published on August 17,2006), Ministry of Industries S.R.No. 194 -Law/2006, Date 18 Shrabon, 1413 B.S./2nd August, 2006 A.D.
15. The Bangladesh Gazette Extraordinary (Published on January 18, 2007), Ministry of Industries S.R.No. 04 -Law/2007, Date 2nd Magh, 1413 B.S./15th January, 2007 A.D. The Standards of Weights and Measures(Packaged Commodities) Rules,2007.
16. The Bangladesh Standards and Testing Institution Ordinance, 1985 (Ordinance No. XXXVII of 1985).

2. SCIENTIFIC SCOPE OF THE PROJECT

A. Research Objectives

Applying intensive consultative and interactive processes and via building up a national awareness and facilitating the ownership among all the stakeholders a ***"Draft National Strategy Paper on Developing Chemical Metrology Infrastructure of Bangladesh"*** would be formulated as the output of this proposed action.

The objectives of the proposed action are to accumulate the following national information:

- the reasons/needs for establishing/improving such a system;
- the areas of principal national need (needs assessment survey);
- the existing relevant resources within the nation (capacity assessment);
- the information needed, available and lacking (gap analysis);
- the establishment of priorities (focusing);
- the experiences of other nations;
- the selection of an appropriate model or strategy (National Policy Formulation & Strategy);
- the development of workable action plans (Area of future intervention outlined/Project Proposals).

B. Relationship of these objectives to the present state of knowledge in the field

In Bangladesh no baseline survey was conducted to assess the actual demand and supply scenario in the area of chemical measurements or chemical metrology service sector. No systematic study results yet to be generated for framing a national policy or sustainability plan for developing the national chemical measurement infrastructure. To formulate other informed decisions and national policies relating health and law enforcement, food quality and safety, environment and research, water and sanitation, trade and defense it is essential to have

information on the availability of the reliable chemical testing facilities and to know the overall country status on chemical measurement system and technical capacity/competency. The output of the proposed action would not only provide a draft national policy, needs assessments survey results or the draft strategy on developing chemical metrology infrastructure rather it would provide an overall baseline information on the overall country status of chemical testing capacity.

C. Research plan including proposed methods or techniques is going to be used.

(1) Plan of action:

	Action	Result
1.	Literature Review: Assessing the legal frameworks, acts, ordinances, laws, SRDs, packaged commodity rules from GoB, OIML, BIPM, APMAP, WTO TBT & SPS requirements, other national and or international QMS requirements say ISO9000, ISO14000, HACCP/ hygiene and or safety standards etc, other technical regulations leaving provisions of chemical metrology/calibration.	Literature and existing knowledge reviewed
2.	Defining key variables & Developing the draft questionnaire for potential chemical metrology service users.	Draft questionnaire developed
3.	Identifying the potential users/sectors of the chemical metrology services in industries, industrial QC laboratories scientific/testing/calibration laboratories and chemical metrology areas. Preparation of primary list of potential users/areas on priority basis. List of industries/ QC Labs, Scientific/ Testing Labs/ Research Labs and List of potential chemical metrology users/areas should be developed.	Potential chemical metrology service users/ market and stakeholders identified
4.	Inception Workshop with Stakeholders and Pre-Testing using Draft Questionnaire: Preliminary stakeholders response collected and overall briefing on the exercise done. Consultation through Working Groups (WG) formation and discussions	Preliminary Stakeholders Response collected
5.	Finalizing the Questionnaire for distribution among the stakeholders	Final Questionnaire ready for distribution
6.	Developing plan of for survey/sampling, interviewing, visiting industries, industrial QC laboratories scientific/testing/calibration facilities, trade and regulatory authorities : Reducing the number of potential users/sectors (or priority basis) to a number for visiting and interviewing so as to represent the actual market demands of the chemical metrology/ calibration services. Method of (representative) sampling and priority would be used.	Sampling plan developed
7.	Distributing and collecting the questionnaire for potential calibration service users in industrial production facilities, industrial QC laboratories, scientific research/testing laboratories, universities. Questionnaire may also be distributed to different trade and or regulatory bodies (FBCCI, DCCI, BAPI, QMS ISO9001 / EMS 14001 Certification Bodies, FIQC, IPH :Food & Drug Testing Laboratories, DCC, Food & Disaster Management Ministry, PPW & SRDI (Ministry of Agriculture), BARI, BIRRI, BFRI, BLRI, BAEC & BCSIR Laboratories.	Completed Questionnaire/ Institutional response collected

8.	Needs assessment survey: Visiting, sampling, and interviewing the potential chemical metrology & calibration service users' site. Assessing the level and trend of industrial development in the country having QAQC (GMP & GLP) requirements and demands for calibration services. Forecasting the potential and or projected market size or market demand for the calibration services.	National Needs Assessment survey done
9.	Assessing present status of the chemical measurement capacity in the country. Reporting the results in terms of technical parameters (understanding supply and demand side).	National Capacity Assessment done
10.	Gap Analyses	Gap analyses done
11.	Focusing and prioritization of unaddressed needs of the country based on availability of national resources and technical capacity.	Priority selected
12.	Selection of proper model and preparation of the "First Draft National Strategy on Developing Chemical Metrology Infrastructure of Bangladesh"	"The First Draft National Strategy" prepared for discussion
13.	Consultative Workshop: Brainstorming Sessions with Experts in the relevant field & First Draft National Strategy presentation for discussion	Stakeholders Comments and recommendations on "The First Draft National Strategy" collected
14.	Inter-ministerial Meeting for further discussion to finalize the Strategy : Presentation of the Final Draft for Discussion	Further replies and comments from the concerned communities incorporated with The Final Draft National Strategy"
15.	Preparation, publication and dissemination of the final "National Strategy on Developing Chemical Metrology Infrastructure of Bangladesh"	The Draft National Strategy" ready for next action
16.	Project phasing out and submission of financial report to MOS&ICT	Project ended

(2) Methodology

With the object of preparing a participatory strategy paper, various methods would be employed. These will include consultation with members of different ministry, participatory consultation meeting at the national and regional levels, direct consultations with the industry people, interfacing with stakeholders to have feedback from them and national consultation workshops on the drafts Strategy Paper.

These stakeholders would be from the following areas:

- regulatory bodies;
- accreditation organizations;
- quality assurance organizations;
- proficiency testing providers;
- industry groups;
- certified reference material producers;
- trade organizations;
- maintenance and service providers;
- government departments;
- health care institutes;
- education sector (universities, etc.);
- testing laboratories;

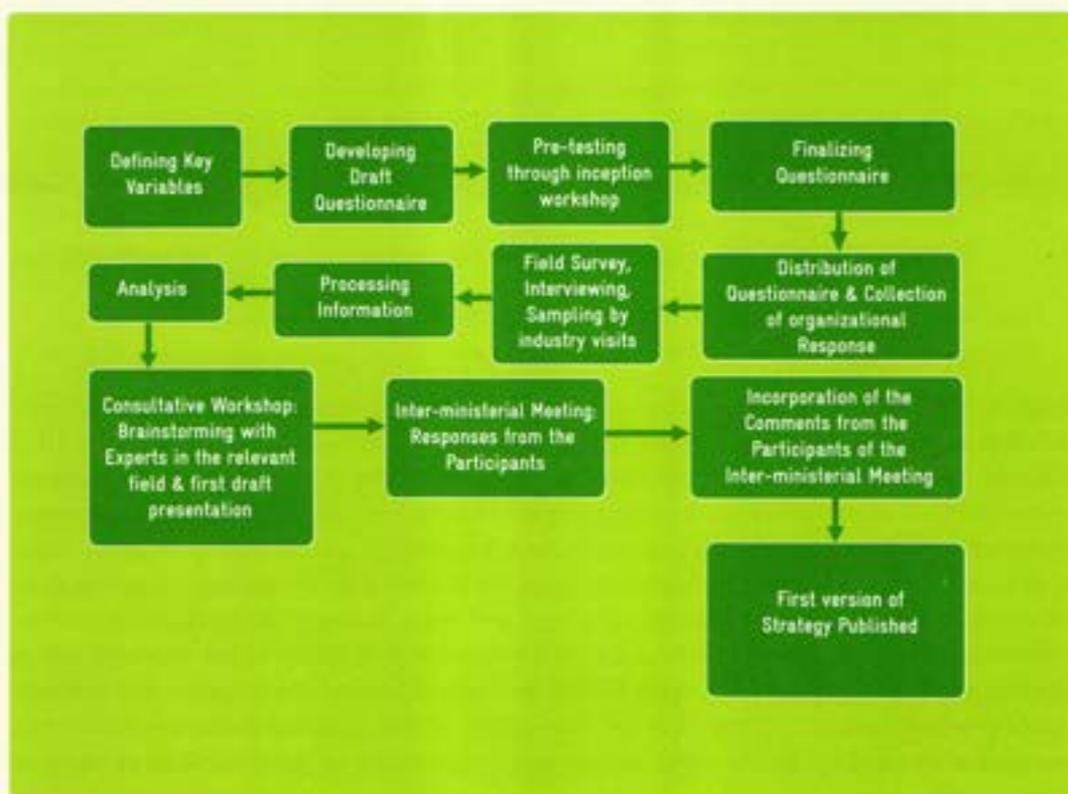


Fig 2: Flow Diagram of Methodology

Sl. No.	Name of milestones	Starting date	Completion date
1	Literature review	1 st week of January	2 nd week of November
2	Defining key variables & Draft Questionnaire development	1 st week of January	2 nd week of January
3	Inception Workshop with Stakeholders and Pre-Testing using Draft Questionnaire		4 th week of January
4	Identifying the potential users/sectors (or priority basis) of the chemical metrology services	1 st week of February	3 rd week of February
5	Finalizing Questionnaire	1 st week of February	3 rd week of February
6	Questionnaire distribution, collection of industrial and organizational response	4 th Week of February	End of April
7	Field survey, Interviewing, Sampling/visiting industries and institutions	1 st week of March	4 th week of June
8	Processing of information	1 st week of July	4 th week of July
9	Data reduction and analysis	1 st week of August	3 rd week of August
10	Second Consultative Workshop: Brainstorming Sessions with Experts in the relevant field & first draft <i>National Strategy Paper</i> presentation for discussion		2 nd week of September
11	Inter-ministerial meeting to ensure the sustainable government support		2 nd week of October
12	Incorporation of the Replies & the Comments	2 nd week of October	4 th week of October
13	Preparation of final project report & publication and dissemination of the final Draft <i>National Strategy Paper</i> through a National Workshop		2 nd week of November
14	Project phasing out and submission of financial report to MOSICT	3 rd Week of November	3 rd Week of December 2009

D. How the project is related to the stated objective of the Special Allocation for Science and Information & Communication Technology programme of the GOB?

To ensure the industrial growth and to accelerate the poverty reduction through strengthening the technical institutions Bangladesh is now striving to establish a national technical arrangement in chemical metrology traceable to SI Units to be accepted by the recognized international communities. En route to develop a viable national infrastructure it is essential that a systematic study: need assessment survey, capacity assessment, gap analysis and strategy formulation should be done. Also to formulate other informed decisions and national policies relating to health and law enforcement, food quality and safety, environment and research, water and sanitation, trade and national security it is essential to have information on the availability of the chemical testing facilities and to know the overall country status on chemical measurement system and technical capacity/competency. It is envisioned that the output of the proposed action would not only provide a draft national policy, needs assessments survey results or the draft strategy paper on developing chemical metrology infrastructure it would also provide a baseline information on the overall country status of chemical testing capacity in comparison with other international best

practices. This is very much in line with the overall objectives of the Special Allocation Programme in SICT (to be allocated under Study Contract Programme).

E. How the programme is related to academic degree programme? (If applicable)
(only for universities/institute award Software ed academic degree) N/A

F. What outputs from the project can be considered for the assessment of its success?

A "Draft National Strategy Paper on Developing Chemical Metrology Infrastructure of Bangladesh" formulated, published and disseminated.

3. LIST OF FACILITIES AVAILABLE (Equipment and other facilities including laboratory space)

All physical infrastructures available to conduct the study from the organization.

PART-IV: BUDGET INFORMATION

1. BUDGET Tk 19,35,000.00

A. Current Year

Item	cost (thousand taka)
1. Minor equipment	130.00
2. Spares for major equipment	0.00
3. Consumable including chemicals, books, software etc and sample collection expenses*	1, 725.00
4. Other essential expenses (maximum one fifth* of the total budget)	80.00
Total	1, 935.00

B. If the project is expected to last more than one year, please include budget estimates for the total period

N/A

2. STATUS OF LEGAL PERSONALITY AND ACCOUNTING SYSTEM?

BCSIR is the leading national scientific and industrial research organization under the Ministry of Science and Information & Communication Technology (MOSICT) established vide Bangladesh Council of Scientific & Industrial Research Ordinance, 1978 (Ordinance No. V of 1978).

PART-V: PREVIOUS FUNDING INFORMATION UNDER SPECIAL ALLOCATION FROM M/O SCIENCE AND INFORMATION & COMMUNICATION TECHNOLOGY (MOSICT)

1. Did you get any funding under special allocation from MOSICT since 1997-98 ?

Yes No

(If your answer is no please escape the following section)

2. Funding year:
3. Amount of fund (in Taka):
4. What was the title of the project ?
5. Project is completed or not ?
6. If not what is the expected date of completion ?
7. Already submitted working report or scientific report or not ?
8. Expected date of submission of Scientific Report ?
9. Any paper published in any international/local journal from this research ?
10. Quote the name of journal, date of publication and title of the paper.

PART-VI: DECLARATION/CERTIFICATION

It is certified that-

- (a) The same project has not been submitted to any other agency/agencies for financial support.
- (b) The research work proposed in this project is not a duplicate work already done or being done in the field (i.e. area of research)
- (c) We agree to accept the terms and conditions developed for the Special Allocation for Science and Information & Communication Technology as mentioned in the Guidelines.
- (d) Associate Investigator assure the responsibility of the Project in case the Principal Investigator leaves the Institution/Organization.
- (e) Project will be provided with access to all available facilities in this organization.

(Mala Khan)

Signature and Name of the
Principal Investigator
(with seal)

(sd/-)

Signature and Name of the Head of the
Organization/Institute/University (with seal)

Signature and Name of the Associate Investigators

Name	Signature
Mala Khan Scientific Officer Instrumentation & Calibration Section Physical Instrumentation Division BCSIR Laboratories, Dhaka	
Dr. M. Akram Hossain Member, Science & Technology Bangladesh Council of Scientific & Industrial Research	
KM Mostafa Anwar National Project Coordinator BQSP, UNIDO	

Annexure- 1

The following facilities and equipments are not available at this moment in BCSIR

	Taka (in thousand)
1. Minor equipment	130.00
• Notebook computer for field usage
2. Spares for major equipment	0.00

3. Consumable including chemicals, books, software etc and sample collection expenses*	
■ Books , Journals	25.00
■ Photocopy , Print, Paper, CD , other consumables	100.00
■ Documentation (1st Draft Strategy Paper & Final Draft Strategy Paper)	400.00
■ Three One day long consultative workshops with stakeholders	750.00
■ Inter ministerial meeting	50.00
■ Industry visit (inside & outside Dhaka)	400.00

4. Other essential expenses (maximum one fifth* of the total budget)	
■ Communication	30.00
■ TA/DA	50.00

Total	Tk. 1, 935.00 thousand

ANNEXURE-K LIST OF PARTICIPANTS

Consultative Workshop on Draft National Strategy for Developing Chemical Metrology Infrastructure of Bangladesh

30 June 2009, BCSIR Council Room, Dhaka, Bangladesh

Organized by:
Instrumentation & Calibration Service Laboratory (ICSL), BCSIR

Sponsored by:
Ministry of Science and Information & Communication Technology, GoB

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ANNEXURE-L

22-07-2009 02:37 FAX 00962186905

MINISTRY OF SCIENCE&ICT

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Government of the People's Republic of Bangladesh
Ministry of Science and Information & Communication Technology
Bangladesh Secretariat, Dhaka

No. MoS&ICT Sec-17/SLST/01/2009/4#0

Date: 22/7/2009

Notice of Meeting

The Ministry of Science and ICT is pleased to invite you to attend the "Inter-Ministerial Meeting on Draft National Strategy for Developing Chemical Metrology Infrastructure of Bangladesh" to be held on **25 July 2009 at 11:00 hrs** at the IFRO Auditorium, Bangladesh Council of Scientific & Industrial Research (BCSIR), Dr. Quamrul-Khuda Road, Dharmohid, Dhaka.

Mr. Moin Khan, Project Director, "Development of ISO/IEC 17025 Accredited Instrumentation and Calibration Service Laboratory for Chemical Measurement", BCSIR will deliver the Keynote Presentation as the main Resource person. **Mr. A. K. M. Abdul Awal Maulander**, Secretary, Ministry of Science and ICT will Chair the meeting.

Thanking you in advance for your kind participation.

Attachment: Program Schedule

Syedur-Rahman
22/7/09
MoS&ICT
Add: 9091, Dhaka
Tel: 9661736

Distribution (not in the order of seniority):

1. Chairman, BCSIR (You are requested to send 10 participants)
2. Chairman, Bangladesh Atomic Energy Commission (You are requested to send 10 participants)
3. Joint Secretary (Administration/Development), Ministry of Science and ICT
4. Mr. Anisul Chakraborty, Joint Secretary & Director General, WTO Cell, Ministry of Commerce, Building 2, Purbapasha, Secretariat, Dhaka-1000
5. Vice Chairman, Export Promotion Bureau (EPB), Ministry of Commerce, TCG Station, 4th Floor, 1 Kazi Nazimuddin, Dhaka-1215
6. Mr. Shahidul Islam, Project Director, BCSIR-2, Export Promotion Bureau, Ministry of Commerce, TCG Station, 4th Floor, 1 Kazi Nazimuddin, Dhaka-1215
7. Prof. Dr. Ismailuddin Ahmed, Chairman, Bangladesh Annotation Board (BAB), Ministry of Industries, Dhaka-1000, 4th Floor, 91 Moulali CA, Dhaka-1000
8. Dr. J. Bewes, DG, S&T
9. Director General, Bangladesh Standards & Testing Institution (BSTI) & President (Bangladesh) Association of Calibration Bodies (SACB), Masur Bhaban, 115-KA Tejgaon IA, Dhaka-1208
10. Mr. Md. Hafiqul Islam, Director General, Department of Fisheries, Mahaysa Bhaba, Segurbagicha, Farming, Uttara-1000
11. Director, Drug Administration, Ministry of Health & Family Welfare, 109/108, Moulali CA, Dhaka-1000
12. Director General, Directorate of Environment, Poribahar Bhaban, Agargaon, Sher-E-Bangla Nagar, Dhaka-1217
13. DG, S&T (You are requested to send all the Directors)
14. DG, S&T (You are requested to send all the Directors)
15. DG, S&T (You are requested to send all the Directors)
16. DG, DPH&E Central Laboratory, Mohakhali, Dhaka
17. DG, S&T
18. DG, S&T
19. Mr. Kasul Karim, Joint Chief, Planning Wing, Socio-economic Infrastructure Division, Planning Commission, Sher-E-Bangla Nagar, Dhaka
20. Mr. Khaleedur Rahman, Joint Chief, Programming Division, Planning Commission, Sher-E-Bangla Nagar, Dhaka
21. Mr. Md. Enayul Hossain, Deputy Chief, Planning Wing, Socio-economic Infrastructure Division, Planning Commission, Sher-E-Bangla Nagar, Dhaka
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23. President, Dhaka Chamber of Commerce & Industry (DCCI) 59-65, Moulali Commercial Area, G.P.O. Box no. 2041, Dhaka-1000
24. President, Chittagong Chamber of Commerce & Industry (CCCI), Chamber House, Agartala CA, Chittagong, Email

ANNEXURE-L

MINISTRY OF SCIENCE & ICT

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25. Mr. Laurent Théron, International Chamber of Commerce & Insurances (ICC) & Managing Director, Nestlé Bangladesh Limited, Gulshan Tower (4th Floor), Plot No.21, Road No.53 Gulshan North C/A, Gulshan-3, Dhaka-1212
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27. Mr. Fazlul Hoque, President, Bangladesh Knitwear Manufacturers & Exporters Association (BKMEA), National Plaza (4th Floor), 5/G, Free School Street, Sonargaon Road, Dhaka-1005
28. President, Bangladesh Textile Mills & Exporters Association (BTMEA), Unique Trade Centre (Level-0), 8 Parthapath, Karaman Bazar, Dhaka-1215
29. Mr. Syed Humeyun Kabir, Director, Bangladesh Frozen Foods Exporters Association (BFFEA), Aman Sea Food Industries Ltd, House No 84, Road No 2, Sonadanga R/A, Khulna
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33. Mr. Nazmul Hossain, President, Bangladesh Association of Pharmaceutics Industries (BAPhI & CEO Bangladesh Pharmaceutics Ltd, 10 Diamond R/A, Road No.7, Dhaka-1205
34. Mr. Quamrul Faruque, General Secretary, Consumer Association of Bangladesh, 5/6 Segunbagicha Dhaka-1002
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36. Ms. Jenny Christensen, Task Manager, Trade Related Technical Assistance (TRTA), Delegation of the European Commission to Bangladesh, Road 84, Plot 7, Gulshan 2, Dhaka
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43. Brig. Gen. Mofiz, National Project Coordinator, IC
44. Consumers Association of Bangladesh (CAB)
45. Chief Chemist, Food Testing Laboratories, Khayra Shaban
46. Head, ICDDR,B
47. Principal, SCLT
48. Director, Drug Administration
49. Drug Testing Laboratory, Mohakhali, Dhaka
50. Institute of Public Health, Mohakhali, Dhaka
51. Chief Chemist, Dhaka City Corporation
52. President, Bangladesh Academy of Science (You are requested to send all fellows)
53. Deputy Secretary (Administration I/2), Ministry of Science and ICT
54. Deputy Scientific Technological Adviser, Ministry of Science and ICT
55. Deputy Secretary/ Senior Assistant Secretary/ Senior Assistant Chief Assistant Secretary/ Assistant Chief (Section- 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18), Ministry of Science and ICT
56. Ms. Mela Khan, Project Director, "Development of ISO/IEC 17025 Accredited Instrumentation and Calibration In-house Laboratory for Chemical Measurement", BQSP

ANNEXURE-L LETTER OF INVITATION

INFRASTRUCTURE OF BANGLADESH

Organized by:
**Ministry of Science and Information & Communication Technology,
Govt. of Bangladesh**

Date & Time: 26 July 2009 (1100 hrs-1230 hrs)

Venue: IFRD Auditorium, Bangladesh Council of Scientific & Industrial Research (BCSIR), Dr. Qudrat-Khuda
Road, Dhanmondi, Dhaka

Chair: **Mr. A. K. M. Abdul Awal Mazumder, Honorable Secretary, Ministry of Science and
ICT**

Program Schedule:

- | | |
|-----------|---|
| 1100 hrs. | Welcome by Mr. A. K. M. Abdul Awal Mazumder, Honorable Secretary, Ministry of Science and ICT |
| 1105 hrs. | Keynote speech: Ms. Mala Khan, Project Director, "Development of ISO/IEC 17025 Accredited Instrumentation and Calibration Service Laboratory for Chemical Measurement", BCSIR |
| 1145 hrs. | Open discussions |
| 1220 hrs. | Closing Remarks by Chair Mr. A. K. M. Abdul Awal Mazumder, Honorable Secretary, Ministry of Science and ICT |
| 1230 hrs. | End of the Inter-ministerial meeting |

[Handwritten signature]

ANNEXURE-M LIST OF PARTICIPANTS

Inter-ministerial Meeting on Draft National Strategy for Developing Chemical Metrology Infrastructure of Bangladesh

26 July 2009, IFRD Auditorium, Dhaka, Bangladesh

Organized by:

Instrumentation & Calibration Service Laboratory (ICSL), BCSIR

Sponsored by:

Ministry of Science and Information & Communication Technology, GoB

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4	M.M. Neaz Uddin	Joint Secretary (Dev) & Chairman (Acting) Bangladesh Council of Scientific & Industrial Research	
5	National Professor Dr. A. K. M. Aminul Haque	Fellow & Vice President Bangladesh Academy of Sciences Home: H-13, Rd-128 Gulshan-1, Dhaka	9894933
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66	Md. Motahar Hossain	Principal Scientific Officer Bangladesh Council of Scientific & Industrial Research	01712-824181
67	Syed Nayeem Ahmed	Technotel Ltd.	01552-100256
68	Nasim Ahmed	Technotel Ltd.	01711-560322
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79	Md. Abul Hossain	Principal Scientific Officer Bangladesh Council of Scientific & Industrial Research	01190-134702
80	Golam Shafuiddin	Deputy Technical Adviser Ministry of Science & ICT	7162523, 01718-526321 golamshafi@hotmail.com
81	Rozana Wahab	Task Manager, Economic Development & TRTA European Commission	8824730 rozana.wahab@ec.europa.eu
82	Dr. Shawkat Alam	International Expert in Legal Framework, UNIDO, Austria & Professor in Law Macquarie University, Australia	shawkat.alam@law.mq.edu.au
83	Shafquat Haider	Director, Federation of Bangladesh Chambers of Commerce & Industries (FBCCI)	9560102-3, 01711-532597 crproco@bol.online.com

Sl.No.	Name	Designation & Organization	Contact No.
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91	Abu Anis Jahangir	Chief Scientific Officer Bangladesh Council of Scientific & Industrial Research	9672991
92	Md. Mushtaqur Rahman	Principal Scientific Officer Bangladesh Council of Scientific & Industrial Research	01710-921539
93	Mala Khan	Project Director & Scientific Officer Bangladesh Council of Scientific & Industrial Research	01715-032057

ANNEXURE-N MEDIA RESPONSE

**THE
DAILY
NEWSPAPER**

Dhaka, Monday
September 3, 2007

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NEW AGE METRO

Seminar on chemical metrology held

Staff Correspondent

The Bangladesh Academy of Science and Pratipalak Society for Culture and Science, an NGO, organised a scientific seminar at the BCSIR auditorium in the Dhaka city.

The science and technology adviser, Tapan Chowdhury, was present as chief guest at the seminar, titled 'Development of Chemical Metrology Infrastructure of Bangladesh'.

Chaired by academy president Shamsur Ali, science and technology secretary SM Oahiduzzaman, BCSIR chairman Chowdhury Mahmud Hasan, Incepta Pharmaceuticals managing director Abdul Muktedir, Pratipalak chairman Shantanu Saha Roy spoke at the seminar.

দৈনিক ইনকিলাব

THE DAILY INQILAB

প্রতিষ্ঠানঃ আলহাজ্ব মাহতাবানা এম এ মন্সুর

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পাঞ্চমজি শরীফ মাশ
প্রশ্নাভীত করতে
হবে : স্বাস্থ্যমন্ত্রী

স্বাস্থ্য মন্ত্রণালয় ১৫ মার্চ ১১-এ
আজকের দিনে স্বাস্থ্য মন্ত্রণালয়
আজকের দিনে স্বাস্থ্য মন্ত্রণালয়
আজকের দিনে স্বাস্থ্য মন্ত্রণালয়

আমাদের সমস্যা

Second Edition Sunday 22 March 2009

প্যাথলজিস্টদের সম্মেলনে স্বাস্থ্যমন্ত্রী বঙ্গবন্ধু

শিগগিরই জাতীয় ল্যাবরেটরি মেডিসিন ইনস্টিটিউট ও রেফারেন্স সেন্টার স্থাপনের কাজ শুরু হবে

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Hospitals to be brought under IT network soon

The government has planned to strengthen the country's community clinics to make them functional again alongside upazila health complexes to ensure people's primary healthcare, Health Minister AFM Ruhul Haque said Saturday, reports UNB.

The community clinics would be functional soon alongside setting up more. Each clinic will be able to provide healthcare services to about 6000 people," he told the inaugural function of the 37th National Conference of Bangladesh Society of Pathologists (BSP) at Dhaka Medical College and Hospital.

He said the government would gradually develop healthcare facilities in all upazila health complexes, district hospitals and the tertiary medicals centres in

major cities removing all mismanagements. "It's essential to improve the emergency delivery facilities in all hospitals."

Dr Haque said the government will soon bring all hospitals, including upazila health complexes, under internet network, to facilitate quicker health services.

He said data transferring from one medical to another would be easier among the hospitals after the internet connection. "The list of medicines and facilities which will be delivered from the hospitals concerned will be kept available on the internet to appraise the people."

Responding to pathologists' demand, the Minister said the Institute of Laboratory Medicine and Referral Centre, would be

built up soon to ensure quality treatment by proper diagnosis of diseases.

The Health Minister emphasized the need for maintaining quality control of laboratories and diagnostic centres sprung up across the country. "We'll have to look into the issue of maintaining the quality of the labs set up haphazardly in the country. If necessary, we'll soon enact a law in this regard."

Prime Minister's Adviser Prof Dr Syed Modasser Ali, DG (Health) Prof Dr Shah Monir Hossain, Vice Chancellor of Bangladesh Sheikh Mujib Medical University Prof Dr Nazrul Islam and DMCII principal Prof Dr Deem Mohammed attended the function held with BSP president Prof Dr Tahmina Hossain in the chair.

যুগান্তর

বুধবার ২৯ জুলাই ২০০৯

আন্তঃমন্ত্রণালয় বৈঠকে বক্তারা রফতানি বৃদ্ধির জন্য রাসায়নিক পরীক্ষাগারগুলো আন্তর্জাতিকমানের হওয়া জরুরি

যুগান্তর রিপোর্ট

প্যারাসিটামল খেয়ে শিশুমৃত্যুর ঘটনা শুধু এবারই ঘটেনি, এমনটি আগেও ঘটেছে। এর জন্য দায়ী পণ্যের মান উন্নয়ন এবং মাননিয়ন্ত্রণে আমাদের ব্যর্থতা। অন্যদিকে চামড়া, চিহ্নি, স্টিকি ও ফুড স্যাপ্লিমেন্টসহ অন্যান্য প্রচলিত ও অপ্রচলিত পণ্যের রফতানি বৃদ্ধির ক্ষেত্রে প্রধান অন্তরায় হল— দেশে উৎপাদিত পণ্যগুলো আন্তর্জাতিকমানের— এটি প্রমাণে আমাদের ব্যর্থতা রয়েছে। 'ইন্টারন্যাশনাল স্ট্যান্ডার্ড' প্রমুখে আমদানিকারকদের আমরা সম্বলিত কতে পারছি না। দিন বদলের প্রত্যাশায় দেশে কেমিক্যাল মেট্রোলজি অবকাঠামো তৈরির বিকল্প নেই।

রোববার বিসিএসআইআরের জ্বালানি গবেষণা ও উন্নয়ন ইন্সটিটিউটে অনুষ্ঠিত আন্তঃমন্ত্রণালয় সভায় আগত বিশেষজ্ঞ বক্তারা মানবস্বাস্থ্য সুরক্ষা, পরিবেশগত বিপর্যয় থেকে মুক্তি, শিল্পের বিকাশে সুস্থ প্রতিযোগিতা এবং রফতানি বৃদ্ধির লক্ষ্যে দেশে রেফারেন্স ল্যাবরেটরি স্থাপন এবং কেমিক্যাল মেট্রোলজি অবকাঠামো নির্মাণের তাগিদ দেন। বিজ্ঞান এবং তথ্য ও যোগাযোগ প্রযুক্তি মন্ত্রণালয়ের সচিব

একেএম আবদুল আউয়াল মজুমদারের সভাপতিত্বে অনুষ্ঠিত সভায় 'খসড়া জাতীয় কেমিক্যাল মেট্রোলজি কৌশলপত্র' প্রকাশ করা হয়। প্রকল্পের পরিচালক ও মুখ্য গবেষক মালা খান কৌশলপত্র রচনার যৌক্তিকতা, পদ্ধতি, লক্ষ্য ও উদ্দেশ্য, বাস্তবায়ন কৌশল, রেফারেন্স ল্যাবগুলোর পরিচালন ও পরিবীক্ষণের সূচক এবং সমন্বয়ের প্রক্রিয়া সম্পর্কে এক মূল্যবান প্রতিবেদন উপস্থাপন করেন।

সভাপতির বক্তব্যে বিজ্ঞান এবং তথ্য যোগাযোগ ও প্রযুক্তি মন্ত্রণালয়ের সচিব একেএম আবদুল আউয়াল বলেন, উৎপাদিত পণ্যের আন্তর্জাতিকমানের স্বীকৃতি না পেলে রফতানি বাড়বে না। দেশে শিল্পের বিকাশ এবং কর্মসংস্থান সৃষ্টি সম্ভব হবে না। ব্যবসা-বাণিজ্যের ক্ষেত্রে নুহু প্রতিযোগিতা, অন্যাকাঙ্ক্ষিত মৃত্যুরোধ, ক্রেতা-ভোক্তাদের অধিকার প্রতিষ্ঠাসহ আমদানিকারকদের আকর্ষণ করতে কেমিক্যাল মেট্রোলজি ইনফ্রাস্ট্রাকচার নির্মাণে একটি খসড়া কৌশলপত্র প্রণয়ন করা হয়েছে। আন্তঃমন্ত্রণালয় সমন্বয়ের মাধ্যমে এই কৌশলপত্র বাস্তবায়নের কাজ এগিয়ে যাবে।

মনের কোটি মানুষের জন্য প্রতিদিন

যায়যায়দি

২২.০৭.২০০৯

জাতীয় ল্যাবগুলোর আন্তর্জাতিক মান অর্জনে ব্যবস্থা নেবে সরকার

যায়দি রিপোর্ট

বিজ্ঞান এবং তথ্য ও যোগাযোগ প্রযুক্তি
মন্ত্রণালয়ের বিশেষ সহায়তা প্রকল্পের
আওতায় রাসায়নিক

পরীক্ষাগারগুলোকে আন্তর্জাতিক মানে
উন্নীত করতে একটি জাতীয় কৌশলপত্র
প্রণয়ন করা হয়েছে।

জানা গেছে, রপ্তানি বাণিজ্যে পণ্যের
গুণগত মান নির্ধারণে দেশীয়
ল্যাবগুলোর ফলাফল আমদানিকারক
দেশগুলো নির্ভুল বলে মনে নেয় না।
ফলে রপ্তানিকারকরা প্রতিনিয়তই নানা
রকম নন-টারিফ প্রতিবন্ধকতার
মুখোমুখি হয়ে থাকে। অভ্যন্তরীণ
বাজারে ভেজাল-নকলের দৌরাড্যা
কমাতেও মানসম্পন্ন রাসায়নিক
পরীক্ষা-নিরীক্ষা অত্যন্ত প্রয়োজন।

রোববার বাংলাদেশ শিল্প ও গবেষণা
পরিষদ মিলনায়তনে অনুষ্ঠিত এক
আন্তঃমন্ত্রণালয় সভায় কৌশলপত্রের

খসড়ার বিভিন্ন দিক তুলে ধরেন বিজ্ঞান
এবং তথ্য ও যোগাযোগ প্রযুক্তি
মন্ত্রণালয়ের অধীন সরকারের
'কেমিক্যাল মেট্রোলজি' উন্নয়ন প্রকল্পের
পরিচালক বিজ্ঞানী মালা খান। এতে
বলা হয়, ২০২১ সাল নাগাদ জাতীয়
অগ্রাধিকার ভিত্তিতে অত্যাবশ্যকীয়
'রেফারেন্স ল্যাবরেটরি'গুলো প্রতিষ্ঠা
করা হবে। খসড়া কৌশলপত্রে বলা
হয়েছে, জাতীয় রেফারেন্স ল্যাবগুলোর
আন্তর্জাতিক স্বীকৃতি অর্জনে প্রয়োজনীয়
ব্যবস্থা সরকার গ্রহণ করবে।

বাংলাদেশ বিজ্ঞান একাডেমির সভাপতি
ও সাউথইস্ট ইউনিভার্সিটির উপাচার্য
অধ্যাপক ড. এম শমশের আলী,
বাংলাদেশ বিজ্ঞান একাডেমির সম্পাদক
ও পরমাণু শক্তি কমিশনের সাবেক
চেয়ারম্যান প্রফেসর ড. নাসিম চৌধুরী,
প্রফেসর ড. মসিহজ্জামান খসড়া
কৌশলপত্র সম্পর্কে মতামত দেন।

ANNEXURE-0 PHOTO ALBUM

Inter-ministerial Meeting on 26 July 2009



Opening announce by M.M. Golam Hossain, Director (Planning & Development, BCSIR)



Honourable Guests from right: (1) Chair of the meeting M.M. Neaz Uddin (Acting Chairman, BCSIR), (2) National Professor Dr. A. K. M. Aminul Haque, (3) A.K.M. Abdul Awal Mazumder (Secretary, Ministry of Science & ICT), (4) Prof. Dr. Nalyyum Choudhury (Ex. Chairman BAEC & Secretary Bangladesh Academy of Sciences), (5) Mesbah Uddin (Member, BCSIR)



Keynote presentation by Mala Khan (Principal Investigator & Project Director, ICSL BCSIR) on "Draft National Strategy for Developing Chemical Metrology Infrastructure of Bangladesh" during the inter-ministerial meeting on 26 July 2009.



Among the audience two UNIDO experts Mr. Jean Michel Virieux (2nd from the left) & Mr. Rajinder Raj Sud (3rd from the left) with Prof. Dr. Z.N. Tahmida Begum (4th from the left)

ANNEXURE-0 PHOTO ALBUM

Interministerial Meeting on 26 July 2009



Ms. Rozana Wahab from European Commission (1st from the left), Dr. Shawkat Alam (2nd from the left) an International Expert of UNIDO from keynote presentation along with other honourable guests.



Prof. Dr. M. Mosihuzzaman (2nd from the left), Ex-Chairman of BCSIR & Fellow of Bangladesh Academy of Sciences is present with Dr. Farid Uddin Ahmed (4th from the left) Member Physical Sciences of Bangladesh Atomic Energy Commission (BAEC)



During the discussion session Prof. Dr. M. Shamsheer Ali (3rd from the left), President of Bangladesh Academy of Sciences & Vice-Chancellor of Southeast University, joins among other honourable guests.



Prof. Dr. Nooruddin Ahmed, Chairman of Bangladesh Accreditation Board (BAB) taking part to the discussion on the central topic.

ANNEXURE-0 PHOTO ALBUM

Interministerial Meeting on 26 July 2009



On behalf of Bangladesh Standards and Testing Institution (BSTI) Mr. Lutfur Raddy, Director (Metrology) taking part to the discussion



Mr. A.K.M. Abdul Awal Mazumder, Hon'ble Secretary, Ministry of Science & ICT moderating the meeting as the Chair.



Dr. Mamta Dawlatana, Director of BCSIR, raising questions before the meeting.



Dr. K.M. Sultanul Aziz, Fellow Bangladesh Academy of Sciences discussing the importance of developing the national chemical metrology system.

ANNEXURE-0 PHOTO ALBUM

Interministerial Meeting on 26 July 2009



Head of the Central Laboratory of Department of Public Health Engineering (DPHE) participating to the open discussion.



Prof. Dr. Mohammed Mosihuzzaman, Professor in Chemistry, Ex-Chairman of BCSIR & Fellow Bangladesh Academy of Sciences exemplifying the importance of developing national infrastructure for metrology in Chemistry.



Keynote speaker Mala Khan answering to the discussants.



Prof. Dr. M. Shamsheer Ali, Professor in Physics, President of Bangladesh Academy of Sciences & Vice-Chancellor of Southeast University, supporting the Strategy on Developing the National Chemical Metrology System.

ANNEXURE-0

PHOTO ALBUM

Interministerial Meeting on 26 July 2009



Prof. Dr. Natyyum Choudhury, Professor in Biotechnology, Ex. Chairman BAEC & Secretary Bangladesh Academy of Sciences taking part to the discussion to endorse the principal of developing national chemical metrology infrastructure.



Mala Khan, Team Leader & Project Director of ICSL BCSIR summarizing the discussions.



Part of the audience present at the meeting.



Title page of the keynote presentation.

ANNEXURE-P
AT INTERNATIONAL METROLOGY CONFERENCE

7th International Conference
on
Advances in Metrology
(AdMet - 2009)

February 18 - 20, 2009

National Physical Laboratory, New Delhi

ABSTRACTS



Organized by

National Physical Laboratory, India (NPLI)
(Council of Scientific and Industrial Research)
Metrology Society of India (MSI)

Sponsored by

**National Accreditation Board for Testing and
Calibration Laboratories (NABL)**
Quality Council of India (QCI)

ANNEXURE-P

AT INTERNATIONAL METROLOGY CONFERENCE

7th International Conference on Advances in Metrology, Feb. 18-20, 2009

OG-07

DEVELOPMENT OF NATIONAL STRATEGY FOR CHEMICAL METROLOGY: A VISION FOR BANGLADESH

Mala Khan

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KM Mostafa Anwar

National Project Coordinator, QMS Component,
Bangladesh Quality Support Programme (BQSP)
United Nations Industrial Development Organization UNIDO

EXTENDED ABSTRACT:

In this era of fierce competition and technology, standards and technical regulations are playing vital roles to protect the interest of consumers of domestic as well as foreign markets. In fact Bangladesh has just started its journey to have the necessary standards, quality, accreditation, metrology (SQAM) called quality & conformity assessment infrastructure to effectively satisfy the requirements of the WTO TBT/SPS agreements. With technical support from UNIDO, from the year 2006, Bangladesh Government has taken initiative to implement a four-years-long technical assistance project "Bangladesh Quality Support Programme (BQSP)" aiming to establish/strengthening this quality infrastructure. But Bangladesh is also badly in need of national infrastructure for chemical metrology to provide the traceability up to international units for chemical testing being conducted by the thousands of laboratories throughout the country. This aspect is not yet covered from the ongoing BQSP project. Moreover, the lack of traceable chemical measurement as well as calibration capacity in chemical testing arena with acceptable level of accuracy, precision and reliability has been identified as major technical barriers to trade for Bangladesh for quite a many years. The creation of a "national chemical metrology infrastructure" to ensure that a nation's chemical measurement results are fit-for-their-intended-purposes has been recognized as an imperative element of conformity assessment infrastructure. With this background under different project the leading Ministry of Science, Information & Communication Technology (MOSICT), Government of Bangladesh has taken initiatives to formulate a "Draft National Strategy Paper on Developing Chemical Metrology Infrastructure of Bangladesh" and as well as to establish the first designated national reference laboratory for chemical measurements in food and pharmaceuticals under a project "Development of ISO/IEC 17025 Accredited Instrumentation & Calibration Service Laboratory for Chemical Measurements". Aim of the Government funded project

ANNEXURE-P AT INTERNATIONAL METROLOGY CONFERENCE

7th International Conference on Advances in Metrology, Feb. 18-20, 2009

OG-07

under Special Allocation for Science and Information & Communication Technology is to develop a Draft National Strategy for establishing a need based chemical metrology infrastructure following a suitable partnership model. Essentially the national chemical metrology infrastructure pyramid should have chemical calibration laboratories at different levels: at the top Primary (Level 1) /National (Level 2) system traceable to SI Units, Reference (level 3), Secondary (Level 4) and Working Standard (User) Laboratories at the bottom. At the beginning, the Government is implementing the first national reference laboratory within Instrumentation & Calibration Service Laboratory (ICSL) Bangladesh Council of Scientific & Industrial Research BCSIR, under Ministry of Science, Information & Communication Technology (MOSICT) focused on food and pharmaceuticals.

In general appropriate regulatory as well as technical environment should be created in the country or major reform should be brought into the testing and certification and metrology area. This is indeed a mammoth task to be taken by the whole nation to formulate a comprehensive testing and measurement infrastructure strategy. Setting up national metrology infrastructure in line with international best practices and establishing national system of measurements in chemistry namely the chemical metrology infrastructure are all indeed knowledge based scientific, technical venture needs study, research and deep understanding in this areas of specialization. Nation should prioritize and allocate resources and also should have a planned motion to have these systems with sufficient and appropriate reference laboratories under different departments having expert knowledge and experience. Network of these reference laboratories in different areas of chemical measurements will serve the backbone of the chemical metrology of the nation. Need for setting up designated national reference laboratories for chemical measurements has been envisioned for quite a many years. Depending upon the national priority and demand, these designated national reference laboratories would play the role of developing and disseminating Certified Matrix Matched Reference Materials (CRMs), would be assigning reference values (ARVs) to the materials, would be running periodic inter-laboratory or proficiency testing actions to check the national testing status and participating key/supplementary comparisons hosted by the regional and or international metrology communities. They will also conduct training in analytical sciences as well as develop the think tank for laboratory quality management system for the national with close interactions among academia-industries and scientific communities. Of course these designated national reference laboratories would be accredited by the ILAC MRA signatories as per applicable international standards and guidelines. Accreditation and metrology and calibration always go hand-in-hand. National strategy for accreditation and metrology should be formulated with participation from all concern in both private and public. Prior to develop this essential and viable national infrastructure in chemical measurements it has been envisioned that a systematic and participatory approach should be followed.

ANNEXURE-P AT INTERNATIONAL METROLOGY CONFERENCE



Opening Ceremony of the International Metrology Conference AdMet 2009, National Physical Laboratory, New Delhi, India.



Team Leader Mala Khan Presenting the Paper on the National Strategy for Developing Chemical Metrology Infrastructure of Bangladesh during AdMet 2009 in India.



Team Leader and Co-author of this National Strategy with a senior metrology scientist Dr. Devinder Gupta of National Physical Laboratory India.



Team Leader and Co-author of this National Strategy with Dr. W. Lewandowski from BIPM, Paris, France during AdMet 2009.

ANNEXURE-Q

JOURNEY TOWARDS BUILDING PARTNERSHIP WITH REGIONAL & INTERNATIONAL CHEMICAL METROLOGY ORGANIZATIONS



Under the leadership of Arch. Yafesh Osman, Hon'ble State-Minister, Ministry of Science & ICT, a high level team from GoB met counterpart authorities in NATA, ILAC & APLAC of Australia in August-September 2010 for building partnership in MIC and accreditation.



Dr. Mala Khan leading Bangladesh team in Chemical Metrology during the Asia Pacific Metrology Programme 2010 26th General Assembly and Related Meeting, 12-18 November 2010, Pattaya, Thailand.



Bangladesh Team at Asia Pacific Metrology Programme 2010 26th General Assembly and Related Meeting, 12-18 November 2010, Pattaya, Thailand.



Dr. Mala Khan participating to the APWP Technical Committee on Amount of Substance (TCQM) during Asia Pacific Metrology Programme in November 2010, Pattaya, Thailand.

ANNEXURE-0

JOURNEY TOWARDS BUILDING PARTNERSHIP WITH REGIONAL & INTERNATIONAL METROLOGY ORGANIZATIONS



At TCQM Symposium on 17 November 2010 during the Asia Pacific Metrology Programme 2010 26th General Assembly and Related Meeting, Thailand.



With Prof. Dr. Robert Kaarls, Secretary of CIPM and President of CCQM BIPM, Paris & Dr. Lindsey from NMI Australia during Asia Pacific Metrology Programme 2010, Thailand.



Team Leader Dr. Mala Khan in discussion with Prof. Dr. Robert Kaarls, Secretary of CIPM and President of CCQM BIPM, Paris.



Team Leader Dr. Mala Khan in discussion with Prof. Dr. Michael Kuhne, Director of BIPM, Paris and Prof. Dr. Robert Kaarls, Secretary of CIPM and President of CCQM BIPM, Paris.

ANNEXURE-R

INVITATION FOR LAUNCHING CEREMONY OF THE NATIONAL CHEMICAL METROLOGY STRATEGY ON 12 JANUARY 2011



I have the honor to invite you to attend a launching ceremony of the **National Strategy for Developing Chemical Metrology Infrastructure of Bangladesh (2009-2021)** organized by Instrumentation & Calibration Service Laboratory (ICSL), BCSIR on Wednesday 12 January 2011 at 11:00 am at the Conference Lounge of the National Press Club, Ramna, Dhaka.

His Excellency Arch. Yeafesh Osman, State-Minister, Ministry of Science and ICT, Government of the People's Republic of Bangladesh has kindly consented to grace the occasion as the **Chief Guest**.

Mr. KH Masud Siddiqui, Hon'ble Secretary, Ministry of Industries and **Md. Abdur Rob Howlader**, Hon'ble Secretary, Ministry of Science and ICT have kindly been agreed to be the **Special**

Guests.

We look forward to your kind participation.



Prof. Dr. SM Imamul Huq
Chairman
Bangladesh Council of Scientific and Industrial Research

Program overview

Program

- 10:45 hrs : Guests take their seats
- 11:00 hrs : Address of Welcome by **Prof. Dr. SM Imamul Huq**, Chairman, BCSIR
- 11:10 hrs : Keynote Speech by **Dr. Mala Khan**, Project Director, ICSL-BCSIR
- 11:40 hrs : Speech by Discussant **Prof. Dr. Nafayyum Choudhury**, Secretary, Bangladesh Academy of Sciences
- 11:50 hrs : Speech by Discussant **Prof. Dr. Mohammad Moshazzaman**, Professor of Chemistry & Ex-Chairman, BCSIR
- 12:00 hrs : Address by the **Special Guest Md. Abdur Rob Howlader**, Hon'ble Secretary, Ministry of Science and ICT, GoB
- 12:10 hrs : Address by the **Special Guest Mr. KH Masud Siddiqui**, Hon'ble Secretary, Ministry of Industry, GoB
- 12:20 hrs : Address by the **Chief Guest His Excellency Arch. Yeafesh Osman**, State-Minister, Ministry of Science and ICT, GoB
- 12:30 hrs : Refreshment & Closure

RSVP : ICSL - BCSIR, Tel: 88-02-9671830, Fax: 88-02-9613022, E-mail: mala@icsl@yahoo.com

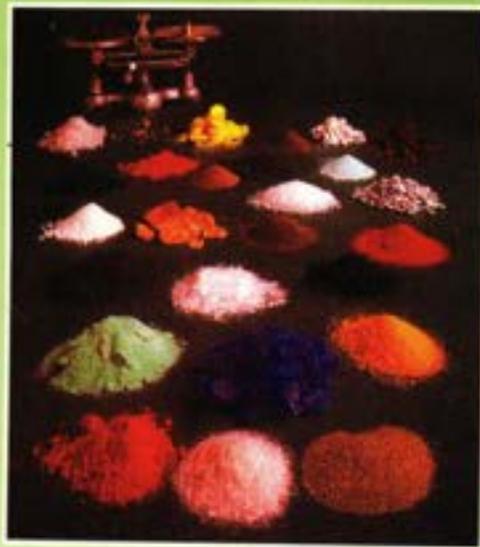
ABOUT THE AUTHORS

Dr. Mala Khan Born on 12 July 1977 Mala Khan is the first woman in Bangladesh working in the field of Laboratory Information Management System (LIMS), Metrology in Chemistry (MIC), Laboratory Instrumentation and their applications. Mala Khan earned her B.Sc. Engg. (Hons.) in Computer Science & Engineering degree from the University of Asia Pacific and she is the recipient of the Chancellors Gold Medal from the Honorable President of the Peoples Republic of Bangladesh & Chancellor of the University as she scored the highest CGPA 3.90 out of 4.00 among all the students from all the department of the University of Asia Pacific in Spring 2000. She received her PhD degree in Chemistry in December 2010 from the American World University, California, USA. As Application Engineer Instrumentation & Information Technology (I&IT) and Assistant Laboratory Manager Mala Khan served Plasma Plus Application & Research Laboratory & AQ Chowdhury & Co. (Pvt.) Ltd. from January 1998 to December 2003. In 2006 she

received Prof. Dr. Nurul Absar Khan Post-Graduate Fellowship from BCSIR. Her present areas of interest are metrology in chemistry, analytical instrumentation, Laboratory Quality Management System as per ISO17025, LIMS and information technology (I&IT) with applications in water analytical environmental, industrial QAQC, science education and research. In 2006 she joined Bangladesh Council of Scientific & Industrial Research BCSIR within Ministry of Science, Information & Communication Technology. From 2008 being the head of a Government funded development project "Development of ISO/IEC 17025 Accredited Instrumentation & Calibration Service Laboratory for Chemical Measurements", she is serving BCSIR as the Project Director & Scientific Officer. Mrs. Khan is a certified EOQ Laboratory Manager & EOQ Laboratory Assessor for ISO/IEC 17025.

KM Mostafa Anwar Born on 02 December 1967 KM Mostafa Anwar received his degree M. Sc. in Physics with First Class First from the University of Dhaka in 1989 and from then he served a number of public and private institutes including UN Agency e.g. The Monthly Computer Jagat, Dhaka University of Engineering & Technology (DUET), Bangladesh Council of Scientific & Industrial Research under the Ministry of Science, Information & Communication Ministry and Plasma Plus Application & Research Laboratory a private run national laboratory, Shimadzu Japan, WAGTECH International UK and UNIDO. As one of the Director lastly he held the position of Laboratory Manager of Plasma Plus+ and served as the Product Manager of AQ Chowdhury & Co. (Pvt.) Ltd. Being the team leader of an expert team in SMTQ, at present Anwar serving UNIDO as National Project Coordinator (QMS Component) of Bangladesh Quality Support Programme BQSP working to strengthening Bangladesh national quality and conformity assessment infrastructure: Standards, Accreditation, Metrology, Testing, Quality and having areas of interest in analytical instrumentation and sciences, laboratory quality management systems LQMS accreditation, Metrology in Chemistry (MIC) with applications in pharmaceutical, water, analytical, environmental, industrial QAQC, science education and research. Anwar is also a musician, actor, poet & journalist traveled many countries and received extensive training and working experience in the area of science and performing arts. Anwar is a certified EOQ Laboratory Manager & EOQ Laboratory Assessor for ISO/IEC 17025.

Dr. M. Akram Hossain Born on 01 July 1952 Dr. Hossain served the position of the Member (Science and Technology) from 2006 for BCSIR and retired in 2009. Dr. Hossain is a Chemical Engineer by training graduated from the Bangladesh University of Engineering & Technology with distinction in Chemical Engineering & Technology. He received MS degree from the Asian Institute of Technology Thailand and in 1993 he also received PhD degree from the Indian Institute of Technology Kharagpur, India. He is the author of more than 20 papers published in the national and international scientific journals and owner of more than 23 patents and processes.



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