Study on Consumer Satisfaction Regarding Pre-paid Meter

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Acknowledgement

At first we wish to express our deepest gratitude to Almighty Allah for the knowledge and perseverance that He has bestowed upon us during this thesis and the successful completion of this thesis work.

We would like to express our sincere appreciation to our thesis supervisor Mohd. Golam Rabbani, Joint Secretary, Power Division, Ministry of Power, Energy and Mineral Resources, for his continuous support and guidance throughout the thesis work. Without his proper directions and suggestions it would be impossible to bring this thesis work to success.

Lastly, thanks and appreciation are also extended to honourable rector, director and other respected officials of Bangladesh Power Management Institute (BPMI) for providing us with the opportunity of performing our research on such an important topic and making necessary arrangements for carrying out the research successfully.

Abstract

Consumer satisfaction is an important factor for any service sector. As Bangladesh is a developing country, service-providing organizations are developing their skills and trying more for achieving the satisfaction of their customers. Electricity distribution is one of those sectors. This research therefore focuses on the determinants of electricity consumers' satisfaction regarding prepaid meters in Uttar Khan area of Dhaka, Bangladesh. The paper designs a scheme to evaluate the satisfaction of consumers regarding prepaid meters to achieve the objective. The objective of this research is to determine consumers' satisfaction level on prepaid meters in Uttar Khan and to identify the causes of dissatisfaction among consumers.

In our study, primary data source implies original raw data collected from users of prepaid meters in Dhaka city. These data have been collected through questionnaires and direct interview over phone. The main data collection methods point out interviews and the use of questionnaires. There were both close-ended and open-ended questions in the questionnaire. However, the main part was filled with close-ended questions where some options were given for each question. For this research study, it was important to know some personal information such as salary range, age etc of the respondents, so it was made anonymous.

The resulting indices show us that 74.5% of the consumers prefer prepaid meters to postpaid meters and the remaining 25.5% prefer postpaid meters and the consumers also want improvement in some fields of the existing service. The paper concludes with policy recommendations for distribution companies such as consumers should be properly informed about all ins and outs of the prepaid meter, a smart recharging process, notification via mobile apps and so on.

Keywords: prepaid meter, electricity distribution, customer satisfaction.

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Chapter 1
Introduction

1.1 Background of the study

Electricity is a major contributor to a nation's economic development. It is the wheel that drives most aspects of everyday life in society. A nation is a compendium of activities and people whose progress is driven by the infrastructural components. Electricity is the source of fuel for that progress. Electricity has invaded every corner of our lives. We need electricity to run infrastructures that make our lives easier, productive, and efficient. Those infrastructures also save lives. Our civilization has come to the point where we cannot think of anything without electricity.

In this era of alternative windows of opportunity, the consumers' satisfaction has become an important variable in every sector. Although there is little or no competition in the electricity distribution sector of Bangladesh, effective monitoring of customer satisfaction and gaining consumers' acceptance are needed here. Electricity generation, transmission, and distribution systems are being more advanced day by day and the rate of improvement is far better than any other period in Bangladesh. About 97% of the country is connected with electricity. The government is taking steps to reach 100% of the population within the first quarter of 2021. So the workplace is getting bigger day by day with new technologies being implemented.

Electricity distribution companies and organizations measure the distributed electricity consumption in two ways- prepaid metering and postpaid metering. As the name implies, prepaid meters require users to pay for their electricity beforehand. The users can choose the amount that they need according to their usage and the digital screen also allows them to monitor their usage. The users can use their monthly recharge as a limit to their electricity usage or the meter can be topped up throughout the month if necessary. On the other hand, Post-paid meters require users to pay after they have already used the electricity. This means that a professional will come in and take the meter reading and a bill will be sent to the consumer. Consumers will continue to get electricity supply if the bill is paid within due time.

1.2 Problem statement

Post-paid meter users usually face some problems which prepaid meter users don't. Those users have to pay the bill monthly in time. They have to pay an extra amount of fine for delayed payment. They need to rely on meter readers. So a possible scope for corruption prevails in the system. Sometimes it may happen that the situation does not allow the meter readers to go to every house for reading. In such cases, the distribution companies cannot but bill the consumers based on estimated consumption which may result in consumer dissatisfaction. During the pandemic of covid'19, it became a big issue for power companies

throughout the country which can be avoided with prepaid meter. On the other hand, prepaid meter users almost never have to face these problems. Moreover, they have the opportunity to check the remaining balance and recharge at suitable times long before the balance is finished. But lack of knowledge about prepaid metering system and some rumors about excessive billing in prepaid meters are main barriers here.

To find out the level of satisfaction of the consumers regarding prepaid meter, we decided to reach out to the consumers from different areas within Dhaka city. But, we had to limit our interaction within online survey due to COVID-19 pandemic situation. We surveyed some consumers under Uttar khan S&D of Dhaka Electric Distribution Company (DESCO) Ltd who are already familiar with prepaid meters. The collected dataset was used to determine the satisfaction of those consumers.

1.3 Objectives

The main objectives of this research are:

(a) To determine consumer satisfaction level on prepaid meter in Uttar Khan region

(b) To identify the causes of dissatisfaction among consumers

(c) To recommend measures which can improve consumer satisfaction

To achieve these objectives, the rest of this paper is organized into four sections. Section II is review of literature while section III discussed the method of procedure and developed a scheme for evaluating customer's satisfaction. In section IV the study analyzed the data collected, computes the consumer satisfaction index as means of benchmarking the performances of the service providers and discussed the results obtained. In Section V the study presents the summary conclusion and the way forward.

Chapter 2
Literature Review

Prepayment metering systems are used by many developed countries. Many researches have been done regarding customer satisfaction and dissatisfaction of using prepaid meter in electricity. Researchers had tried to find the reasons behind the satisfaction and dissatisfaction. Some research showed the user friendliness on the prepayment metering system of electricity usage. Consumers are also becoming more conscious as a result of using the prepaid meter. There was some reduction in energy consumption. Cost-benefit was also analyzed from a consumer perspective. Operational cost-benefit was analyzed in some research.

Most of the research papers we found were from the internet. We explored the google scholar to discover the previous work done regarding prepaid meter of electricity usage. The searching keywords we used are following:

- Prepaid meter user satisfaction
- Consumer study prepaid meter
- Consumer satisfaction regarding prepaid electricity meter

We also searched research papers in IEEE xplore digital library. ResearchGate was also explored to find the existing work on prepayment metering system of power usage.

Wagner and Wiegand [1] studied 40 households in Germany through semi-structured interviews and found that the consumers were satisfied in 80 percent cases. However, their study ignored the amount of consumption by the interviewed customers.

Quensnelle [2] provided observations based on the electricity payment system that had been used for a long time in Woodstock of Ontario, Canada. The study showed how prepaid meter had resulted in financial gain in both consumer and distribution end. The concerned area saw a 15 - 20 percent reduction in electricity consumption where prepaid meter was used. The consumers did not incur energy debt due to the use of prepaid meter. The distribution sector did not have to persuade consumers to pay their dues. It also saved the cost associated to bill generation.

Usefulness of prepaid meters are also being studied for other sectors in Bangladesh. Rahman and Sarwar [3] published an analysis on the pilot project undertaken by Titas Gas Transmission & Distribution Company Ltd. (TGTDCL) where 1000 consumers were provided prepaid meters for domestic natural gas usage. It was found that the estimated gas consumption was reduced in the households where prepaid meters were installed. But the study also concluded that the consumption figures were subjected to assumption in many cases due to lack of technical preparedness of the project.

Miyogo [4] analyzed the feedback of both clients and employees to know their thoughts regarding the impact of conversion to pre-paid electricity bill payment system from post-paid billing system in west kenya, kisumu. They worked with stratified random sampling method and used questionnaires to collect data. The survey outcome showed that this new billing system has some positive sides. The most favourable outcome was that this system made the customers more cautious about power consumption. The research also came out with the necessity of installing suitable equipment as human resource element to consider. They tried to find out whether the respondents wanted to go back to the previous billing system. Among 1020 consumers about 92% didn't want to use the previous one again. On the other hand, 92% respondents said that there is no difference regarding the expense of using prepaid billing. The consumers also noted that they got immediate connection for this new service. The consumers were also asked about the response to their complaints and most of the respondents noted that they got services within 2 days to 1 week.

Casarin and Nicollier [5] in their research noted that many countries have adopted prepaid meters. They took an attempt to do cost-benefit analysis of using prepaid meters. They found out that this service increased welfare and the main favoured position was to reduce debt of account receivables and also to cheapen operational and financial costs. This service also ensured better distribution of resources for the consumers. However, the research study found that the main dispute related to use of prepaid meter was to cut off service due to low income of some consumers. This is one of the most important controversial issues of using prepaid meter Prepaid meters at that time. The cost-benefit analysis showed one of the main problems was higher cost of technology that can't be affordable to some extent.

Ajenikoko and Adelusi [6] present the impact of prepaid energy metering system on electricity consumption in Ogbomoso South Local Government Area of Oyo state. The results of the paper revealed that about 95% of the pre-paid meter users in the local government area are conscious of electricity management, about 74% of the post-paid meter users were just wasting the energy.

Malama [7] conducted a research on the impact of using prepaid meters in Zambia. This was a mixture of both qualitative and quantitative data where 151 questionnaires were filled up from the prepaid meter users. The study was categorised in three segments such as low, medium and high income consumers. It also identified the changes of behaviour because of pre-payment billing system. Some important aspects that were pointed out throughout this research were reduction of debt and pilferage, other sources of energy, disconnection of customers etc. Here, a direct interview was taken to collect qualitative data. The main outcome from the report was the consumers were satisfied as they had control over expense and there was no dispute on paying bills. Many of the respondents notified that there was progress in their budget for electricity and there was a decrease in the number of historical debt also. Some consumers under this research also revealed that they had to spend less money for electricity after the arrival of this service.

Zamrudi , Karim, Faridha, Maharaniand, and Kuraesin [8] developed a model to measure the consumer preference in adopting the smart power in the household sector. Data was collected by survey involving 437 samples in South East Kalimantan Province, Indonesia. The findings of this study enhance the understanding of consumer perceptions and behaviour and are able to help the policy maker in considering the future policy in developing the power production and development plan. The results show that most variables are able to affect the intention to use smart power meters.

Dadzie [9] examined customers' perception and acceptability on the use of Prepaid Meter in Accra West Region of ECG. The main aim of this study was to improve customer acceptability by determining the level of acceptability of Prepaid Meters, analyse the factors customers consider before accepting the use of Prepaid Meters, and determine management strategy in promoting prepaid usage. Research design adopted for the study was the descriptive method. Both primary and secondary sources of data were used with questionnaires as the main instrument for collecting primary data on customer acceptability, factors customers perceive before accepting the use of prepaid meters. The stratified sampling method was used to categorise customers into the type of tariff whether domestic or commercial. A total sample size of 391 were drawn out of 18,000 customers in a district. One of the major findings of the study is that customers consider a number of factors before accepting the prepaid meter for use and these include user friendliness of the prepaid meter, durability of the prepaid meter and access to prepaid meter vending points. It is therefore being recommended that management should consider improving durability and access to prepaid meter vending points in order to improve customer acceptability on the use of prepaid meters.

Esteves [10] conducted a research on the experiences of prepaid meters users of Brazil. At the time of this research, a new regulation regarding prepaid meters was introduced in Brazil. In this study, the authors assessed the positive sides and risks of pre-payment meters in Brazil. This study was conducted by assessing both consumers and electricity companies. The authors found out that both developed and countries under developed have international knowledge on this prepaid billing system.

With a view to finding the impacts of using Prepaid meters in Bangladesh, Tawhida Akand, Ziaul Haq, Abdullah Al Mejbah [11] have carried out statistical research on the commercial and technical data of the distribution companies of Bangladesh. This paper gives us notable insightful information and statistics which can be used in policy making and next moves in the field of prepaid metering of the power distribution sector of Bangladesh.

Addressing the growing concern of huge non-technical electricity loss in the developing countries, Mohammad, Borua and Abdullah Arafat [12], in this paper, have proposed a prepaid energy metering system. In their proposed mechanism, both the meter and the server

are to be equipped with GSM modules which will facilitate bidirectional communication between the two ends using the existing GSM infrastructure. The most impactful invention of this paper for Bangladesh scenario is an easy and convenient way of recharging the prepaid meters, about which most of the Bangladeshi prepaid users complain. Here, the paper describes how the consumers can easily recharge their prepaid meter by sending a PIN number hidden in a scratch card to the server using SMS.This paper presents some ways to control meter bypassing and tampering. Finally, the paper has voiced for taking legal actions against the dishonest consumers and hence the authors have proposed some ways to control electricity theft using their system.

Ipsos, M. O. R. I. [13] published a report on smart meters. Making energy uses visible was the primary motivation of this study. This study showed a high level of consumer satisfaction using smart prepaid meters. The report dynamically compared prepaid meter with post paid meter in respect of power consumption and also showed how consumers became aware of power consumption.

Research was done on satisfaction, dissatisfaction of consumers. The effects of energy consumptions and cost-benefit were also analyzed in some research. There is no effective study on customer satisfaction regarding prepayment electricity meters in Bangladesh. Main purpose is to find the reasons behind satisfaction and dissatisfaction and also analyze the satisfaction level and analyze the consumer's opinion based on their social status.

Chapter 3
Research Methodology

The chapter looks at research methodology adopted in accomplishing the study. The research paradigm, purpose of the research, sampling procedures, data collection methods, data analysis, quality of research, ethical issues and limitations are discussed in this section.

3.1. Research Paradigms

Research paradigms can be defined as patterns of beliefs and practices that control inquiry within a discipline by providing lenses, frames and processes through which investigation is accomplished. There are quantitative and qualitative paradigms and a combination of both is known as mixed paradigms research. Qualitative research is defined as a multi-method in focus, involving an interpretive, naturalistic approach to its subject matter. Quantitative research can be explained as explaining phenomena by collecting numerical data that are analyzed using mathematically based methods. Mixed research method is research in which the researcher uses the qualitative research paradigm for one phase of a research study and the quantitative research paradigm for another phase of the study.

The study therefore explored both quantitative and qualitative data for the study through the use of both questionnaires and interview guides for the study to solicit data from the respondents.

3.2. Sampling procedures

The section discusses the population of the study, sample size and sampling technique adopted in selecting the respondents for the study.

3.2.1. Population and Sample Size

A population refers to the total number of all units of the issue or phenomenon to be investigated into which all the possible observations of the same kind are made. The research population consisted of customers who use pre-paid meters within the Uttar Khan S&D Division of DESCO. The population of the study is estimated at about 31,000 customers who use prepaid metering systems. The sample size is the number of respondents chosen from the population to be a representative of the population. For the purpose of the study, 51 respondents were selected for the study made up of 51 customers within Uttar Khan S&D Division of DESCO.

Slovin's sampling method [15] was adopted in determining the sample size. The formula is presented as;

n = N/ [1+N (e)2]

(where n = sample size; N = sample frame; and e = margin of error/confidence level. Using a margin of error of 13.5%, with a population of 31,000,

n = N/ [1+N (e)2]

= 31,000/[1 + 31,000(0.135)2]
= 31,000/565.975 = 54.77

The sample size selected was therefore 55.

3.2.3. Sampling Techniques

Sampling is the act, process, or technique of selecting a suitable sample, or a representative part of a population for the purpose of determining parameters or characteristics of the whole population [16]. The study adopted a purposive and convenience sampling technique to select customers who use pre-paid meters. This form of sample is often used when working with very small samples such as in case study research and when you wish to select cases that are particularly informative [17]. The researcher adopted these methods in selecting respondents that could give the right data for the particular studies.

3.3. Sources of data

Sources of data indicates the ways through which researchers collect necessary information and data to complete the study. It also reveals the originality of collected information. Basically, data sources can be of two types such as primary and Secondary data source. In our research study, we included both of these sources.

3.3.1 Primary source of data collection

In our study, primary data source implies original raw data collected from users of prepaid meters in Dhaka city. These data have been collected through questionnaires and direct interview over telephone.

3.3.2. Secondary source of data collection

Secondary data signifies the already existed data that are available to use for research study. Our secondary sources were as below:

- Newspapers
- Journals
- Manuals
- Reports
- Reports from internet
- Websites of related fields
- Related articles from the internet etc.

3.4. Data Collection Methods

The main data collection methods point out interviews and the use of questionnaires. These are being discussed below in short:

3.4.1. Interview

Direct information was collected from some users of prepaid meters over phone calls. It was necessary to collect information from them and to take permission so that they could fill-up questionnaires.

3.4.2. Questionnaire

According to Wunsch and Gades [18] for field study questionnaire is the most efficient tool This was the main source of collecting data for this research study. There were both close-ended and open-ended questions in the questionnaire. However, the main part was filled with close-ended questions where some options were given for each question. There was only one open ended question to know their thoughts regarding the satisfaction or dissatisfaction about prepaid meters. Other 10 questions were close-ended. For this research study, it was important to know some personal information such as salary range, age etc of the respondents, so it was made anonymous. In this present time, questionnaires were the best option to collect data. So, our study became fully dependent on this major part. The questions that we used for the field study questionnaire are given in the Appendix A.

3.5 Data presentation

Data was collected to make useful analysis. We used google survey form to collect and store data. There are so many online and offline tools and softwares for data analysis. We used "Social Science Statistics" (https://www.socscistatistics.com/), an online platform for statistical analysis. Microsoft Excel was used to generate graphical representation of different dependent and independent variables. Impact of different variables were also observed. Correlation coefficient between dependent and independent variables were discussed in the data analysis section. Significant explanations and interpretations were represented in the form of graphs, charts and tables. Feedbacks received from the participants were also summarized and analyzed.

Chapter 4
Data Analysis

4.1 Analysis with respect to gender

In this section, we have analysed consumer satisfaction in using prepaid meters on gender basis.

In Table 4.1, we see that out of the total sample population taken, the male consumers' overall satisfaction has reached 71.383%, whereas, the overall satisfaction of the female consumers rests in 55.625%.

Gender	Overall Satisfaction Level
Male	71.383%
Female	55.625%

Table 4.1

From Figure 4.1, we observe that 79% of the male consumers prefer prepaid to postpaid. On the other hand, 50% of the female consumers prefer prepaid to postpaid.

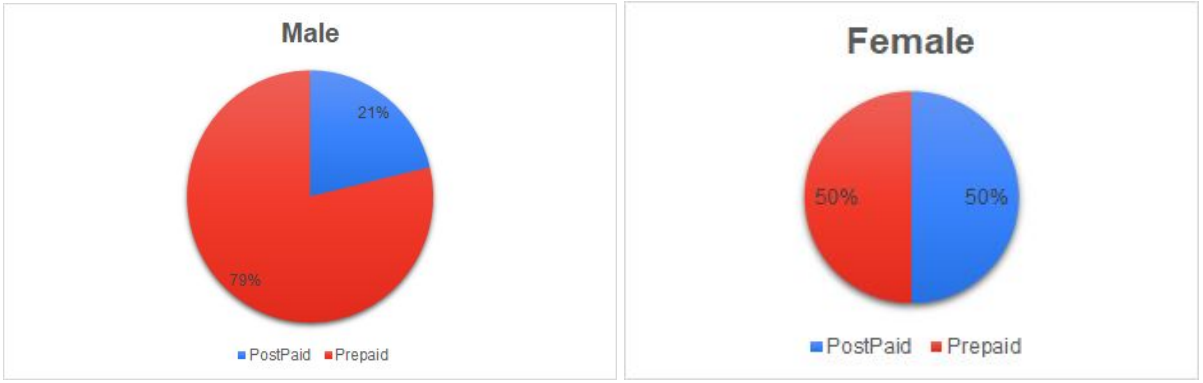

Figure 4.1

Figure 4.2 shows us that the male users rated the reliability of prepaid meters 3.57 (out of 5), while the female users rated its reliability 2.75 (out of 5).

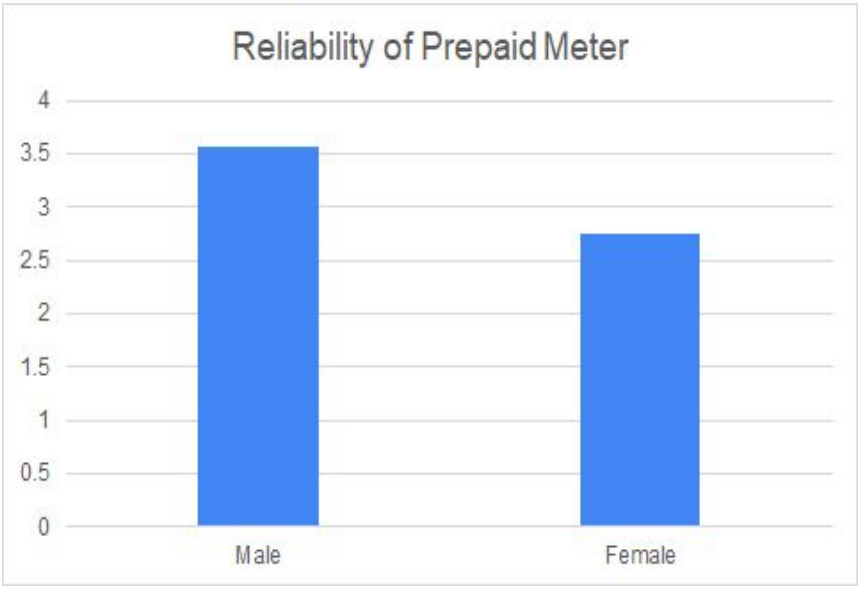

Figure 4.2

In Figure 4.3, we see that the male users rated their increased awareness of electricity usage because of prepaid meter 3.83 (out of 5), while female users rated this 3.25 (out of 5).

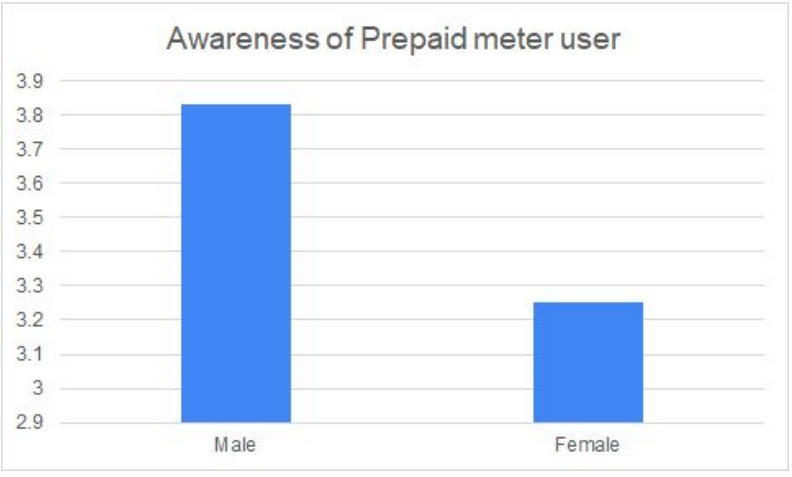

Figure 4.3

Table 4.2 shows that the satisfaction level of the male consumers with the emergency loan amount which is provided after a prepaid account balance gets zero is 63.4%, while the satisfaction level of the female consumers in this case is 47.5%.

Gender	Satisfaction with Emergency Loan Amount
Male	63.4%
Female	47.5%

Table 4.2

Table 4.3 depicts another important aspect of the consumer feedback on conversion from postpaid meters to prepaid meters. It says that the level of ease and convenience of adaptability the male consumers feel while getting converted from postpaid to prepaid is 74.04%, whereas, the female consumers feeling of ease and convenience in this aspect is 55%.

Gender	Ease of Conversion
Male	74.04%
Female	55%

Table 4.3

4.2 Analysis with respect to different age ranges

In this section, we have analysed consumer satisfaction in using prepaid meters based on different age ranges of the consumers.

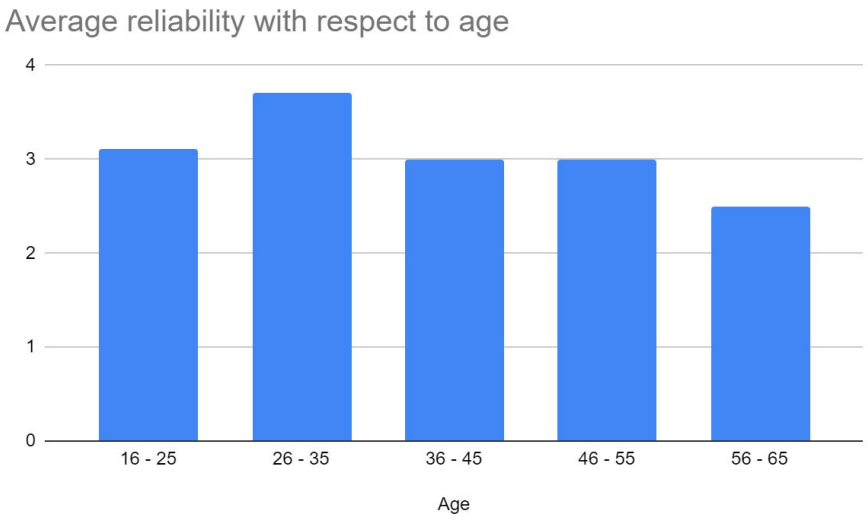

Figure 4.4