Campus Utility Services and Consumer Satisfaction: A Study on Jahangirnagar University

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ABSTRACT

Utility services are essential for our modern life. This study has been focused on exploring the sector of the utility services at the study area. To know the performance and efficiency of the services, the study has been assessing level of consumer satisfaction at the area. Among the other theories, this study has chosen the SERVQUAL model to understand the service quality, the consumer satisfaction and the relationship among them. This theory emphasizes on the gap between service quality and consumer to evaluate the sector. According to the theory, five factors affect the performance of a service provider. They are tangibles, reliability, responsiveness, assurance and empathy. Experts have said that SERVQUAL model should have applied at different sector at a regular interval. This study used both the qualitative and quantitative data for analysis. The group of respondents includes the students, teachers and official staffs who are accommodated with the residence facility at the area. Most of the respondents are students. As being autonomous, the Jahangirnagar University has their own authority to plan and maintain the utility services. But as for the lack of resources, electricity is provided by Palli-biddut office and gas is provided by Titas gas. There is sufficient water supply and the water bodies at the area have been resourceful for the Drainage management. Though there are many facilities, the consumers still face various problems regarding the service sectors. For example, gas supply is not accessible for everyone. Load-shading is a common problem across the country, but at the study area there is no electric generator while water supply is completely dependent on the electricity. There is a lot space to improve the service sector at the study area.

Keywords: Utility Services, Consumptions, Satisfaction, Jahangirnagar University

1.0 Introduction:

Effective utility service is the major requirements of an easy and comfortable life. Utility services include linear services such as power supply, water supply, drainage and sewerage and so on. Campus utility service means the utility services which are planned for a campus. We all know that the common goal of universities provide a student friendly is to environment so that students could enrich their knowledge and prepare for their future. To do so maintaining the campus environment is necessary. Services such as water supply and drainage, power supply, sewerage network, telecommunication etc. are basic requirements for city life [1]. It is very important for management to be efficient and effective way. Successful managements are the ones that are very efficient [2].

A campus is the location of a university, college or school's main building which includes libraries, lecture halls, residential halls and park-like settings [3]. World Bank (2015) defined a plan as a dynamic long-term planning document that

provides a conceptual layout to guide future growth and development. Planning is about making the connection between buildings, social settings, and their surrounding environments.

On campuses, there are many different ways that utilities infrastructure and central plant facilities are established and expanded. Some campuses have completely completed utility infrastructure master plans that follow the guidelines outlined in their guideline. Others have none at all or have very limited versions of plans, which cover only some of the utilities The University's [4]. Infrastructure and utilities provide the means to achieve sustainability objectives by efficiently servicing existing and new campus buildings.

Every campus has its own network of utility services. There is already a network of utilities on the Trinity University cable campus, including television. sanitary sewage, storm, gas, and electricity [5]. A district energy system (hot and chilled water), water and wastewater systems, storm water. electricity. telecommunications networks, and other minor utilities are all included in The Brock University's campus utilities [6]. Some campuses have their own power plants to support itself like the University of New Hampshire [7]. Some other campuses like the University of Duke not only generate their own services but also support the native town with utility services [8].

Campus utility plan not only provides services but also conserve the environment. The University of New Hampshire adopted a utility plan in 2010 in order to reduce carbon emission. They successfully reduced their dependency on coal for power generate from 85% to 15%. They are still working on it to reach dependency rate at 0% [7]. The California State University is developing their master plan so that future campus building growth at each campus can be accommodated cost effectively while reducing carbon emissions [9].

Decades ago, Parasuraman et al. (1991) composed a survey instrument (SERVQUAL) for extracting measures of service quality from a series of questions that describe satisfaction with tangible and intangible aspects of service delivery on a Likert scale. Peterson and Wison (1992), however, describe consumer satisfaction as a "complex and elusive phenomenon". Jahangirnagar University is one of the significant universities of Bangladesh. It is completely residential university with the bliss of natural beauty. As an institution, Jahangirnagar University many natural resources like water bodies, plenty of trees, open space etc.

There were two campus master plans for Jahangirnagar University. First one was prepared in 1968 and second was prepared in 1977. Therefore, the location and topography of the area is suitable for the educational purpose.

Campus utility services are provided and controlled by the university authority. The provided utility services are electricity, water supply, gas supply, sanitary sewer, drainage and telecommunication most of which are owned and operated by the university authority. There is no power plant in the university. The water supply quality depends on many factors like height of water table, presents of contaminants, smell and taste etc. Natural water bodies are very well positioned to support drainage and sanitary sewers. But the expose of waste water to the natural water bodies can cause the degradation of the environment.

Every year thousands of students get admitted to this university for higher

education. There are teachers, officers and other employees in the university. The university has halls for students and six types of quarters for the teachers, officers and other employees. They are the consumer of campus utility services at Jahangirnagar University.

2.0 Aims and Objectives:

This study has been aimed at achieving the following objectives-

- To study of the condition of present utility services in the study area.
- To find out the limitation and identify the reasons behind it.

After successful completion, the study will be expected to results in:

- <u>Explore the level of performance of</u> <u>utility services</u>: Different services have different quality that is provided to the consumers.
- <u>Conceptualization about the major</u> <u>issues of present utility management</u> <u>system</u>: While exploring the quality, issues around these utility services both positive and negative facts will come forward and those could be easily identified through the successful study.
- <u>Some steps for further improve of the</u> <u>utility services</u>: After the issues are identified, it will be easy for measuring and determining some steps to recommend for the further development of the current utility service system.

3.0 Theories for measuring consumer satisfaction level

The interest in studying consumer satisfaction has been increasing over the last few decades. It is evident from various books, articles, and studies that different discipline view various aspect of consumer satisfaction and since 80's, new concepts and researches has explored into this area (Sattari, 2007, pp. 27; Mill, 2002, pp. 7). Consumer satisfaction does not have any universally accepted definition (McCollough, 2000- cited in: - Mill, 2002). Consumer satisfaction circles is the extent of a reasoning process or an emotional А definition state. of satisfaction is stated by Howard and Sheth (1969- cited in Mill, 2002 pp-08) where satisfaction is "the consumer's cognitive state of being rewarded adequately or inadequately for the sacrifice he has experienced." Engel and Blackwood (1982 - cited in Mill, 2002 pp-08) realize it as "an evaluation (cognitive) that the chosen alternative is consistent with prior beliefs with respect to that alternative." Numerous theories explain consumer satisfaction.

Among these theories, two theories are widely accepted and also give the finest explanation of consumer satisfaction though neither addresses the relationship between consumer satisfaction and actual consumption, one of them is the disconfirmation paradigm and other one is the expectancy-value concept [10, 11]. There is another standard model called SERVQUAL to explain the service quality.

Through a series of research articles published between 1977 and 1980, Oliver constructed and developed the notion of disconfirmation paradigm. According to this idea, customers evaluate a new service by comparing it to a standard they have established, and how well the service performs in comparison to this standard determines how confident they are in the service. According to the notion, a user's decision to utilize any service or product is influenced by their attitudes, expectations, and intentions (Mill, 2002; Oliver, 1980). While consuming, before and after, an insight of performance occurs as user assess the experience. In this approach consumers compare service the performance with their previous experience standard or expectation (Oliver

1980; Mill, 2002), and finally results into confirmation, satisfaction, or dissatisfaction.

The standard has four components in this are- expectations, theory and they perceived performance, disconfirmation, satisfaction (Mill, 2002, pp. 8). Expectation signifies pre-consumption expectation. Accomplishment of service mentions the user's acuity of service. Disconfirmation shows if there is a difference between expectations and performance. Lastly, putting together the outcomes for various quality of the service, is the best way to determine consumer satisfaction. The components which are stated above, the first of them do affect satisfaction but they do not determine whether lead to satisfaction or dissatisfaction. They also cannot explain the interrelation among the variables.

Oliver (1980- cited in Mill, 2002 pp-9) remarks some operational assumptions to be part of this theory. These are shown below.

- Expectations are not fulfilled when performance falls short of expectations, which happens when the former is the case. Due to confirmation, excellent performance will lead to a relatively high degree of expectations being satisfied (EM).
- When expectations are low, low performance will result in very low EM ratings, while high performance will result in very high EM ratings due to a surprise effect.
- If expectations match performance at any level, conformation will result and EM will represent the value of the expectations/ performance level.

The most popular and widespread used model to explain ideas of managing consumer satisfaction is SERVQUAL (Soutar, 2001- cited in Mill, 2002). This model explains service quality and the gap in it. According to the model, service quality is the difference between consumer expectations and consumer perception of service experienced. When the perception of service acknowledged is different than what is expected, the gap in service quality occurs (Zeithaml et al, 1990- cited in Mill, 2002; All Answers Ltd., 2019).

This study follows the SERVQUAL model to explain the consumer satisfaction of the study area. Jahangirnagar University is a public university and has an autonomous authority. The university authority manages to provide all of the utility services to consumer.

For Disconfirmation paradigm theory to work, multiple groups of service-holders are required to compare the services or goods. As for the Expectancy-value theory, the impact of attribute importance on consumer decision making is also widely recognized [11].

On the other hand, SERVQUAL model is usual to measure the quality of services as well as to study the fields for improvement according to the service provider's strength and weakness [12]. Professionals exclaim that the SERVQUAL model survey should be conducted every year because—

- This model is very important to measure and manage the quality of service across the various contexts and cultures and also standard for different academics and professionals.
- After collecting the data and analyzing them, several tools are used to visualized them. Because of which, it is easy to find out the field for improvement at the service.
- This model is also useful for the betterment of the interior service superiority.

• The model can be applied in different sectors and can arrange for a basic framework. [13]

After the discussion of above, it can be said that the SERVQUAL model is appropriate for this study. So, this method is applied here.

4.0 Correlation between Service Quality and Consumer Satisfaction

The relationship between service quality and consumer satisfaction have been debated in many research papers during the past decade.

Many studies indicate that high service quality results in satisfaction and loyalty with the product or service and a satisfied user will have the willingness to mention someone else, reduces complaints and service provider can achieve the consumer retention (All Answers Ltd., 2019).



Fig-1: Correlation between service quality and consumer satisfaction [14]

In spite of the connectedness between service quality and consumer satisfaction in several fields, some researchers have marked that service quality is not related to consumer satisfaction under certain conditions. For example, Parasuraman et al. (1985) have proved through various research that although users were satisfied with a particular service, they did not think of it as high quality.

A client may, thus, indicate on a questionnaire that a certain bank is of good quality, even if this did not mean this consumer was content with using the bank, according to Storbacka et al. (1994). Its loan interest rates can be excessive or it might not satisfy the customer's preferences for another reason (pp. 24).

5.0 Well-planned campus utility services and service quality

Every campus has their own resources and focuses on specific utility services. Jahangirnagar University has plenty of natural resources, planned infrastructure and many utilities service like electricity supply, water supply, gas supply, drainage etc. and so on. This study will show these specific campus utility services provided at area by the university authority, their capacity and consumer's satisfaction. An elaborate literature survey was carried out to have a basic understanding on provided utility services Jahangirnagar of University.

In their research, Tysseling and Boyce (2017) concentrated on the campus utilities master plans of several American universities. They claimed that a master

plan for campus utilities served as a planning, construction, and facilities management tool. The plan is used in part by the facilities manager to specify the campus's demands for utility and energy systems as well as the related expenses.

In her titled study- Campus Growth Guided by Long-term and Short-term Plans, Bradley (2018) discussed the implementation of campus plan and growth of the University of Notre Dame at different sectors. As a part of long-range plan, a utility service plan was adopted in 2010 and updated in 2017, the major priority was the reduction of carbon emissions from the combined heat and power plant and was succeed in reducing use of coal from 85% to 15% since then. The campus master plan of the University of New Hampshire was prepared in 2012. The University of New Hampshire (2013) published "Utility Master Plan" which provides a standard for campus utility service. They classified services into two utility classes. Infrastructure utilities include cooling system, heating system, electric system and cogeneration and alternative energy. The civil utilities include natural gas distribution system, water distribution system, sanitary sewer system and storm water sewer system.

In his study "Campus Network Strategies: A Small College Perspective" the CIO of Saint Louis University, Moberg (1999) offered some advice to administrators and faculty about things to consider while planning a campus network. He stated that a network is an organic entity that will continually evolve, grow, and mutate.

In "Utilities Infrastructure Master Plan Guide" published from the California State University, Taylor et al. (2018) provided a guideline for the development of campus utility services, where they described that the campus is recommended to maintain a status matrix of its utilities and infrastructure systems at all times.

"Vancouver Campus Plan" (2010) was published from the University of British Columbia which stated that the Campus Plan supports an integrated approach to infrastructure planning with the physical planning for buildings and landscape in a way that is functional and provides multiple benefits and the future of sustainability is these three elements working together effectively.

Service providers provide services to different society and community. But the level of service quality is not same at every place. Because the service needs have a way to reach to consumer. Especially for utility services like water supply, gas supply etc. which need switching stations, pipe lines, plants or power booster and many more things are not simple to provide. They need a planned way to reach to people. A wellplanned infrastructure can provide the way for constant and quality services.

6.0 Methodology:

A "organized set of rules or actions to help produce accurate and trustworthy study results" [15, p. 242] is what is referred to as research methodology. It is the analyzing procedure for data and information and the method for choosing the research area and interpreting the survey. It varies depending on the type of research activity being conducted and the resources and logistical assistance that are available [16]. So, the methods, tools and techniques, which are used to conduct a particular study or research for achieving specific sets of objectives that constitute the methodology which is very important to complete the work. The purpose of methodology is to "describe and examine the logic of research methods and techniques, revealing their powers and limitations, generalizing successes and

failures, finding domains of appropriate, and predicting possible contributions to knowledge" [17, p. 18].

This study maintains a systematically wellarranged methodology for the achievement and successful accomplishment of the dissertation work. It involves processes and techniques of the different steps in the way of completing any project. The stages of collecting data, step by step guidelines etc. are also included in the methodology of a report, project, thesis or dissertation [18].

The methodology of this study is divided into following segments as—

- Conceptualization
- Design of the Research
- Data collection procedure
- Design of the Research
- Data Analysis
- Report Preparation/Outline

6.1 Objective Variable Matrix

An objective variable matrix is required to meet the objectives. The outcome of a research depends fully on the data accumulated for this purpose. Data list has been developed in detail encompassing all the variables related to each objective indicating the sources which is best possible to get the accurate data.

Table-1: Objective Variable				
Objective	Variable	Sources		
To study of the condition of present utility services in the study area.	-Satisfaction level of utility services - Structural Difference	-Observation survey, -Questionnaire interview -Secondary sources.		
To find out the limitation and identify the reasons behind it.	-Structural Difference -User characteristics -Physical Dimension	-Secondary sources -Questionnaire interview -Observation survey		

Table-1: Obiective Variable

Source: Author, 2020

6.2 Method Used for Conducting Research

This research has been conducted by using the mixed method. Mixed method research adopting a research strategy means employing more than one type of research method. Both qualitative and quantitative data are necessary for finding the final outcome of this research. It follows qualitative work as a facilitator of quantitative work [19]. The main focus of the research is to identify the provided utility services and their present condition if they are sufficient for the consumers i.e. physical condition, quality of service, convenience rendered. Qualitative part of this research helps to gain that idea. Quantitative approach is used to identify the consumer satisfaction and associated problems at the study area. So qualitative and quantitative data both is used in this study. The motivation for this approach is that the qualitative and quantitative data and analysis gives a clear image of the research topic [19].

'Mixing' refers to the process whereby the qualitative and quantitative elements are interlinked to produce a fuller account of the research problem [20, p. 255, 21, p. 51]. This integration can occur at any stage(s) of the search process, but is vital to the rigor of the mixed methods research [20]. However, there is a level of agreement that mixed methods research is subtly different to 'multi-method research' [22, p. 113]. Where mixed methods research combines qualitative and

quantitative research in a single study, multi-method research involves data collection using two methods from the same paradigm (e.g., interviews and focus groups, surveys and medical record audit) [23].

The research is both qualitative and quantitative one where the main agenda is to find out the existing conditions of the utility services at Jahangirnagar University.

Primary data of the research is collected from field survey and interview of key personnel. Information like- usage of utility service, satisfaction level, associated problems etc. are collected from questionnaire survey. Policies and plans related to utility services, campus utility services, institutional capacity and phase of plan implementation etc. information are collected through key informant interview.

6.3 Data Analysis

Data analysis is an important stage of a research as it provides a foundation of drawing conclusion of the research and thereafter recommendations. Collected data and information from the primary and secondary sources are represented in tabular form. Questionnaire provides the qualitative data about the services. The respondents have provided their opinion about how they feel about the services which help to find out the present condition of the utility services. With the help MS Excel, the data from the respondents are managed in the tabular format and later transformed into charts, graphs or bars. To find out the limitation of the utility services and the reason of limitation, both quantitative and qualitative played important roles have here. Limitation of utility service is determined by analyzing the qualitative data through the structured questionnaire which is mainly the description of the respondents or the consumer's experience. Reasons of limitation of utility service is determined by analyzing the quantitative data such as number of machineries, capacity of them, design capacity etc. These quantitative data are collected through the secondary source and the semi-structured question.

For example, to find out the limitation of water supply system, the study has analyzed the qualitative data like water quality, problems etc. from the respondents through the structured question. the semi-structured questionnaire answers the quantitative data like how many water pumps are active, what their horse power are and what their capacity are etc. by analyzing these quantitative data, this study has several reasons for limitation of water supply system. The quality and issues are identified. Some effective measures and steps have been given on the basis of collected data, information and linked analysis. The software Arc map 10.3 is used to develop various map to show the different utility service systems, location of residential areas etc.

The study has been prepared with sequential chapters. An assigned format, instructed by the supervisor, is maintained throughout the report and a draft report have been prepared. The draft report is being submitted to the study supervisor for correction, modification and recommendation. After fulfillment of the required guidelines the final study report has to be finally submitted to the supervisor.

7.0 Study Area Profile

Jahangirnagar University was established in 20 August 1970. It was focused in 'Master Plan-1967'. First it was proposed to establish at Shalna- Joydevpur, but finally it was approved to established at the present location at Savar. Jahangirnagar University is located about 33 km away from the capital city of

Dhaka. It is the only residential university and the second largest University of Bangladesh. It has an area of about 696.56 acres [24]. Renowned architect 'Mazharul Islam" designed the master plan of the university in 1968. Another revised master plan was prepared in 1977.

Jahangirnagar University is located at 2 km north from Savar Upazilla of Dhaka district. Savar is a township about 30 km to the north-west of Dhaka.

The area is part of the Madhupur tract, which is known to have risen during Pleistocene period and located at the south part of the tract. For this reason, the area has a natural tendency for the growth of vegetation (trees, shrubs and herbs) in all direction. [24]

The university area consisted of 744.66 acre. Among this, 625.66 acre belong to Savar Dairy Farm and rest 119 acre to the local people. In 1984, following the notification, gives away 50.58-acre land to Bangladesh Public Administrative Training Center (BPATC). For this reason, the total land is now become 696.56 acre. Jahangirnagar University consisted of 6 mouzas and they are- Dakkhin croke, Gerua, Barawalia, Senwalia, Uttar croke and Chalia [25].



Fig-2: Location map of Jahangirnagar University Source: Department of G&E-JU, 2019

Jahangirnagar University is a fully residential university. There are 8 men hostels/halls and 8 women hostels/halls for the accommodation of the students which contains 8878 seats. The rest pupils are accommodated at the common rooms and T.V. rooms of different halls. Some students also commute from Dhaka to campus regularly. The number of total students is about 13026 [25].

There are 720 teachers, 316 officers, 853 class-III employees, 623 class-IV

employees are employed in Jahangirnagar University. A-type, B-type, C-type, Dtype, E-type and F-type buildings are provided for their accommodation. [26]

8.0 An overview of provided utility services and their condition

To meet the first objective of the study, some interviews have been conducted with different personnel from various offices such as the register office, the engineering office, and the biddut office etc. to

understand the service sectors at the study area. The interviews have been done through a semi-structured questionnaire.

Different types of utility services such as water supply, electricity and gas supply, sewerage system, drainage system etc. are provided in Jahangirnagar University.

8.1 Water supply:

In the master plan overhead tank system was proposed to provide water supply. Although step to construct an overhead tank was taken, due to some limitation, the work had been stopped. Now the Water supply is under the supervision of the chief engineer of the engineering office and totally depends on water pumps and electricity.

There are six electric pumps for water supply in the campus. This service sector has 22 employees including one civil engineer, two officers, five assistants and fourteen workers are employed for these services. Though there is no central reservoir in the study area, every academic and residential building has their own reservoirs [27]. Locations of water pumps at Jahangirnagar University are shown in figure-5.2 and locations of reservoirs at the campus are shown in figure-5.3



Fig- 1: Location of water reservoirs and water pump at Jahangirnagar University Source: Author, 2020

8.2 Electricity supply

There is a small power station on the south-west corner of the university. Electricity is supplied by palli-biddut and maintained by Biddut Office of Jahangirnagar University. There are 61 employees engaged in electricity supply which includes 2 junior engineers, 11 technicians, 2 inspectors, 3 security guards, 9 billing agents, 1 DGM, 1 AGM (OSM) and 32 MCMs (Metter messenger). There are 4 transformers with the total capacity of 35 MVA (Million Volt-Amps) and also 4 power transformers. The current supply of electricity is 1.0 megawatts per day. There is no electric generator in the campus area [28]. Location of electric pole and transformers are shown in figure-5.5.



Fig-4: Location of electric pole and transformers at JU (source-Author, 2020)

8.3 Gas supply

Gas is supplied by Titas Gas. All halls and quarters have sufficient supply of gas. Exceptional, Nawab Faizunnesa Hall doesn't have any gas supply. Besides the male halls has gas access only in the canteen. (Engineering office, 2021)

8.4 Sewerage system:

A sound sewerage system is absolutely essential for human being to ensure a livable environment. Proper sewerage system is very important to carry human excreta and to minimize the risk of infectious disease and which will ensure pollution free environment [29]. To discharge the sewage, a well-planned sewerage network is imperative. Present population of the campus is about 20000 (Register Office, 2020).

The existing sewerage system of the Jahangirnagar University campus is simple and more or less suitable for the present condition. Here some modification is done to small bore system. The solid waste is stored in waste bins, liquid waste in septic tank and waste water is disposed in nearby water bodies. There is no treatment plant. So, some risk arrived in water pollution and ground water contamination (Engineering office, 2021).

But construction of treatment plant in the campus area will not be feasible for such type of small area. Besides the treatment plant the sewerage system of this area is more or less suitable. But there is some problem in the management system. As for example: use of low-quality construction materials, lack of regular and timely maintenance of the sewerage system, lack of skilled man power and so on.

Although there is sufficient number of septic tank and pit for proper sewerage management but they are not properly excavated by the contactor [30].

As for example, although according to design layout of the particular building the depth of the septic tank is given 10 feet but they are hardly excavated 10 feet for misappropriate of money. As a result, there is seen overflow before the design period.



Fig- 5: Septic tanks at Bishwakabi Rabindranath Tagore Hall, JU Source: Author, 2020

8.5 Water drainage system:

All of the storm water drainages are connected to any one of lakes or water bodies in the campus. All the lakes are inter-connected with each other. Moreover, the water bodies are linked with the river Bangshi. The storm water drainage system at Jahangirnagar University is shown in the map. There are both the natural and artificial drainage exist in the campus (Engineering Office, 2020). Strom water drainage system at Jahangirnagar university is shown in figure-5.8.



Fig- 6: Drainage at Begum Sufia Kamal Hall Source: Author, 2019



Source: Department of Geography and Environment, Jahangirnagar University

Fig- 7: Storm water drainage system at Jahangirnagar University

8.6 Consumers at Jahangirnagar University

The consumers of these utility services include students, teachers, and officeemployees of the Jahangirnagar University who having living in the university halls or quarter. There is also another type of consumers. They are the family members of the teachers, officers and office staffs.

Jahangirnagar University has 16 halls for student. Most of the halls have a number of students which is more than the accommodated seat. So, the students need to stay at common room, TV room, guest room and prayer room of the halls (Register Office, 2020). Quarters for teachers are accommodated according to post, seniority and joining terms and condition. For seniors, A-type quarter is accommodated. Then B, C and D are provided accordingly. Bachelor quarter is also provided for teacher. [26]

Administrative officials are accommodated in E-type and F-type quarter. These quarters are located at the Northern part of the campus area. There are 853 3rd grade employees and 623 4th grade employees. But the total accommodation units are 214, which is only 14.5% of the total need. There are temporary employees working in halls, cafeteria. [26]

9.0 Consumer satisfaction analysis at Jahangirnagar University

To meet the second objective of the study, a questionnaire has been conducted through two structured questionnaires; one for the students and another for the teachers and officials. This analysis section indicates the factors of the SERVQUAL Model, which are tangibles, reliability, responsiveness, assurance and empathy. Tangibles include the appearance of physical amenities, personnel and information material. Reliability includes accurateness of the service's performance and dependency of the consumers on it. Responsiveness indicates the helpful nature toward the consumers and providing a quick service. Assurance is the combination of competence, courtesy, credibility, and security. Empathy is the combination of access, communication and understanding the consumer. [31]

9.1.1 Service quality (Electricity supply)

The respondents have been asked to rate the service of electricity supply. The respondents' opinions point to their reliability on the service. The responses are collected in the form of Likert scale where 1 stand for very bad, 2 stands for bad, 3 stands for moderate, 4 stands for good and 5 for very good. About 47.9% of the respondents have rated the service as very good and 41.4% have rated it as good. Although major part of the respondents has responded positively, there are some answers said it otherwise like 9.9% rated moderate and 0.8% have rated it as bed.



Fig- 8: Satisfaction level on electricity supply

Here, X- axis indicates the number of respondents, Y- axis indicates the satisfaction or rating and the bars indicate the satisfaction level. The total number of respondents, N=374. Here the value of mean or the average rating of this service is 4.36 and value of standard deviation is 0.692, here standard deviation is low which means the data points are clustered around the mean value.

9.1.2 Analysis of the responses (Electricity supply)

Jointly, respondents' satisfaction level with the service of electricity supply is highly positive as the value of mean is 4.36; which is above the neutral point of 3 on the Likert scale.

From the Regression model analysis, it is showed that significance level for all

independent variables is much higher than acceptable significance level of 0.05, except for occupation (0.004). So, there is dependency of rating the electricity supply on independent variables which means from all the independent variables only occupation has impact on the level of satisfaction. Respondents from different occupations have different opinions about the service quality

9.1.3 Problems associated with electricity supply

The respondent has pointed some problem associated with electricity supply.

Here, every respondent has responded to this question, thus there is no missing value.



Fig- 9: Problems associated with electricity supply

Here, many individuals have shared multiple problems. 44.65% respondents have stated that there is no problem with electricity supply. 46.26% has stated that they are facing load shading problems. 12.03% and 11.76% of the respondent have experienced accordingly low voltage and electric hazard at the study area.

0.016% of the respondents have pointed out some other problem associated with electricity supply like less electricians, frequently repairing transformer etc.

9.2 Water supply

9.2.1 Service quality (Water supply)

In the questionnaire survey, respondents have been asked about the water quality at the study area to find out the accuracy of the service.

The answers have been collected in the form of Likert scale. About 69.8% of the respondent's opinion fall in the category of "very good", 21.4% have rated as good, 7.2% have rated as moderate and bad and very bad rates have been given by 0.8% in both.



Fig- 10: Satisfaction level on drinking water supply

Here, X- axis indicates the number of respondents, Y- axis indicates the satisfaction or rating and the bars indicate the satisfaction level. The total number of respondents, N=374. Here the value of mean or the average rating of this service is 4.59 and value of standard deviation is 0.73, here standard deviation is low which means the data points are clustered around the mean value.

9.2.2 Analysis of the responses (Water supply)

Jointly, respondents' satisfaction level with the service of water supply is highly positive as the value of mean is 4.59; which is above the neutral point of 3 on the Likert scale.

From the Regression model analysis, it is showed that significance level for all

independent variables is much lower than acceptable significance level of 0.05, except for age of respondent (0.675). So, there is dependency of rating service quality of water supply on independent variables which means from all the independent variables only age of the respondent has no impact on the level of satisfaction. Opinions of the respondents varies from one to each other in the field of occupation, gender and duration of living.

9.2.3 Water shortage

The respondents have been asked whether they experienced any water shortage in the study area. 39% of the respondents have replied that they never experienced water shortage in the study area.

Experience of shortage	Frequency	Percent (%)
No, never	146	39.0
Rarely	210	56.1
Almost every year	9	2.4
There is a constant problem	9	2.4
Total	374	100

 Table- 2: Experience of water shortage

Though 39% respondents have replied that they never have any water shortage, 56.1% has been rarely experience water shortage, 2.4% of the respondents have been facing it almost every year and 2.4% of the respondents have a constant problem with water supply.

9.2.4 Bottle water

The respondents have been asked whether they use bottle water in the study area. The answers to this question indicate the

dependency of the respondents on the water they are provided in the study area. Most of the respondents have said that they don't use bottle at the study area and many of them are using bottle water.

About 87.2% of the respondents have said they do not use bottle water at the study though 6.4% uses a few amounts of bottle and other 6.4% depends on bottle water.

9.2.5 Problems associated with water supply

The respondents have been asked if they face any problems associated with water supply. Many respondents have pointed multiple problems. These problems are shown below on the figure.

Here, every respondent has answered to this question, thus there is no missing value.



Fig-11: Problems associated with water supply

Here, 389 responses have been found out from 374 respondents. 75.8% of the respondents stated none of the problems, 3.1% complained about odor, 8.7% pointed at water shortage and 12.3% of the respondents have faced the problem of outdated tools.

9.3 Gas supply 9.3.1 Type of fuel

The respondents have been questioning which type of fuel they have access or they are using. About 51.1% of the respondents uses LPG, 12% are concerned that they use natural gas and 36.9% stated that they do not use any type of fuel.

9.3.2 Service quality (gas supply)

The respondents have been asked to rate the service quality of gas supply at the study area. The opinions indicate the reliability of the respondents on the service of gas supply. The answers have been collected in the form of Likert scale. About 31.1% of the respondents have stated the quality of gas supply "very good", 24.3% have rated the service as good. Majority of the respondent, approximately 40.6% have rated the gas supply as moderate. 1.6% and 2.1% of the respondents have rated the service as bad and very bad consequently.



Fig- 12: Satisfaction level on gas supply

Here, X- axis indicates the number of respondents, Y- axis indicates the satisfaction or rating and the bars indicate the satisfaction level. The total number of respondents, N=374. Here the value of mean or the average rating of this service is 3.81 and value of standard deviation is 0.971, here standard deviation is low which means the data points are clustered around the mean value.

9.3.3 Analysis of the responses (gas supply)

Jointly, respondents' satisfaction level with the service of gas supply is positive as the value of mean is 3.81; which is above the neutral point of 3 on the Likert scale.

From the Regression model analysis, it is showed that significance level for all independent variables is much higher than acceptable significance level of 0.05, except for gender (0.000) and type of residence (0.003). So, there is dependency of rating service quality of gas supply on independent variables which means from all the independent variables only gender and type of residence have impact on the level of satisfaction. Respondents from different gender has different level of satisfaction with gas supply. Respondents from quarters and female halls have access to gas supply. But respondents from male halls do not have any access to gas.

9.3.4 Burner system

The respondents have been asked whether they any type of burner system on their own. They have different types of burner system like stove, rice-cooker, electric heater and wood burner etc.

Here, 406 burners are available from 374 respondents. 46.2% of the respondents do not have any burner system. 4.4% have stove, 33.7% have rice=cooker and 14.3% have electric heater. There is also 1,5% of the respondents who have wood-burner.



Fig-13: Burner system at study area

9.3.5 Problems associated with gas supply

The respondents have been asked whether they have faced any problem related to gas supply. Their answers have helped to identify the major problems of gas supply. Here, 89.3% of the respondents have answered this question and 10.7% of the respondents have not responded to it. About 74.1% of the respondents have not faced any problems from gas supply, 11.3% have faced shortage of supply and 4.4% have pointed as bad quality. There is also 10.2% of the respondents who have pointed out some other problems such as no access of gas at male hall and unusable stoves etc.



Fig- 14: Problems associated with gas supply

9.4 Drainage System

9.4.1 Service Quality (Drainage System) The respondents have been asked to rate the drainage system at the study area. The answers have been collected in the form of Likert scale.

About 26.5% of the respondents have stated the service quality of drainage

system at the study area as "very good". Maximum of the respondents, 46% have rated the service quality as good and 17.9% have rated the service as moderate. 7.2% have stated it as bad and 2.4% have rated the service as very bad.



Fig- 15: Satisfaction level on drainage system

Here, X- axis indicates the number of respondents, Y- axis indicates the satisfaction or rating and the bars indicate the satisfaction level. The total number of respondents, N=374. Here the value of mean or the average rating of this service is 3.87 and value of standard deviation is 0.967, here standard deviation is low which means the data points are clustered around the mean value.

9.4.2 Analysis of the responses (Drainage System)

Jointly, respondents' satisfaction level with the service of drainage system is positive as the value of mean is 3.87; which is above the neutral point of 3 on the Likert scale.

From the Regression model analysis, it is showed that significance level for all independent variables is much lower than acceptable significance level of 0.05, except for type of residence (0.543).

So, there is dependency of rating service quality of drainage system on independent variables which means from all the independent variables only type of residence does not have any impact on the level of satisfaction.

9.4.3 Water logging

The respondents have been asked if they face water logging and affected by it at the study area.

Here, 62.3% of the respondents have experienced water logging and been affected by it at the study area. On the other hand, 37.7% have stated that either they have never experienced water logging or water logging have never affected their life.

9.4.4 Problems associated with drainage system

The respondents have been asked whether the face any problem related to drainage system. Total 183 respondents have said that they face problems from drainage system.

Responses	Frequency	Percent (%)
Yes	183	48.9
No	191	51.1
Total	374	100

Table- 3: Facing problems with drainage system

Here, 48.9% of the respondents have faced drainage problem and 51.1% do not have any problem from drainage system.

The respondents have been asked to mention the problems that they are facing from drainage system. They have mentioned many problems associated with drainage system. About 49.5% of respondents have responded to answer the problems and 50.5% have not responded to it.

Here, the study has got 260 variables from 185 responses. 36.5% of the respondents have faced water logging, 18.1% have faced odor problem and 45.4% have suffered from problem of movement.



Fig-16: Problems associated with drainage system

9.5 Sewerage System

9.5.1 Service quality (sewerage system)

To rate the service quality of sewerage system, only teachers and officials have been asked. Majority of the respondents (95.6%) have not participated. 2.9% of the respondents have rated sewerage system as good, 0.9% have rated it as very good and .5% as moderate.



Fig- 17: Satisfaction level on sewerage system

Here, X- axis indicates the number of respondents, Y- axis indicates the satisfaction or rating and the bars indicate the satisfaction level. The total number of respondents, N=374. Here the value of mean or the average rating of this service is 0.17 and value of standard deviation is 0.831, here standard deviation is high which means the data points are widely spreader around the mean value.

9.5.2 Analysis of the responses (sewerage system)

Jointly, respondents' satisfaction level with the service of sewerage system is negative as the value of mean is 0.17; which is way very low than the neutral point of 3 on the Likert scale.

From the Regression model, it is showed that significance level for all independent variables is much lower than acceptable significance level of 0.05, except for gender (0.169). So, there is dependency of rating service quality of drainage system on independent variables which means from all the independent variables only gender does not have any impact on the level of satisfaction.

9.5.3 Problems associated with sewerage system

The respondents have been asked if they face any problem associated with sewerage.

About 2.4% of the respondent have said that they are having problems from sewerage system and 1.9% have said that they do not face any problem from sewerage system.

The respondents who have faced the problems, they are asked to mention those problems. The problems they have described are shown below on the figue. The respondents who have responded are 16 which is only 4.3% of the total respondents.

Here, 25 responses have been taken from 16 respondents. Out of 25 responses, 52% response is about odor problem, 40% response is about malfunctioning septic tank and the respondents also have pointed out 4% of some other problem which includes no regular inspection.



Fig- 18: Problems associated with sewerage system

10.0 Recommended steps to the improve service quality

The study has included some recommendation steps to improve the service quality and prevent the problems that the respondents are facing at study area. These steps are given below.

- To prevent the problems due to loadshading, electric generators need to install at the area.
- More electrician should be recruited and inspections of electric tools should be done more regularly to avoid the problems of low voltage and electric hazards.
- Though every residential building has their own water tank or reservoir, a central reservoir should be installed which will reduce the problem of water shortage.
- Outdated tools should be replaced with new ones.
- Everyone should have access to the service of gas supply including the male students.
- Drainage and sewerage systems should be improved with a goal to reduce the exposure of contaminated water to the nature.

11.0 Conclusion

As of the only residential university of Bangladesh, Jahangirnagar university has a vast number of students to provide accommodations and facilities. Utility services are the most important among them to provide and also the main concern of the study. Though the study has some limitation like lack of data and manpower, it has been focused to explore the services and look into the view of consumers at the services.

To understand the level of consumer satisfaction at the services, there are many theories have been developed. Among them, SERVQUAL Model is one of simple and effective theory which study the gaps of service quality and also the five factors to understand consumer's behavior towards the services.

The study has used mixed approach so both the qualitative and the quantitative data have been collected. Different type of sources is used to collect primary and secondary data for study. Three questionnaires are used in the process which include two structured questionnaires and a semi-structured questionnaire. Different software like MS Excel, SPSS, GIS etc. has been used in order to collect and analysis the data.

Jahangirnagar University has an area of 696.56 acres. It has 16 student hall and also accommodation for a number of teachers and officials. The area has a master plan of 1968 and a review master plan of 1977.

Provided utility services at study area include electricity supply, water supply, gas supply, drainage system and sewerage system. Electricity is provided by pallibiddut and fuel gas is provided by Titas gas. Drainage system is facilitated with the water bodies at the area. All the utility services are provided at the study area under the supervision of Engineering office.

Every respondent has different opinions about the services. According to the respondents rating opinion, service quality of water is rated as highest (mean value 4.59) and sewerage is rated as lowest (mean value 0.17).

Utility services like water supply, electricity supply, gas supply, drainage and sewerage system are important for our everyday life. It also important to evaluate these sectors for further improvement. This study has tried to explore the sector and meet the thoughts of respondents

about the utility services. This study has been come up with a SWOT and some recommended steps against the problems faced by the respondents of the study.

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