

Customer Satisfaction Measurement and Analysis Using Six Sigma in Telecom Sector of Pakistan

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Abstract: *Six Sigma has been considered as a powerful business strategy that employs a well structured continuous improvement methodology to reduce process variability and waste within the business processes along with an effective application of statistical tools and techniques. The objective of the study measures the customer satisfaction in Telecom sector of Khyber Pakhtoonkhwa (KPK) province of Pakistan by using the six sigma methodology. The study further elaborates a mixture of tools and techniques within the Six Sigma methodologies to achieve substantial financial benefits and customers' satisfaction. The results of Pareto chart shows that there are number of problems which are facing by the existing customers in the customer service centre i.e., network problems, sim registration problems, billing issues, sim blocking issues, etc.*

Keywords: Six sigma; Customer satisfaction; Telecom sector; Pareto chart; Pakistan.

1. Introduction

During the last few decades, many quality improvement methodologies have been used extensively by organizations to improve products and services. Techniques like continuous quality improvement (CQI) and total quality management (TQM) have been used to provide modest, incremental improvements, whereas techniques like reengineering and Six Sigma have been used for making drastic changes to existing processes.

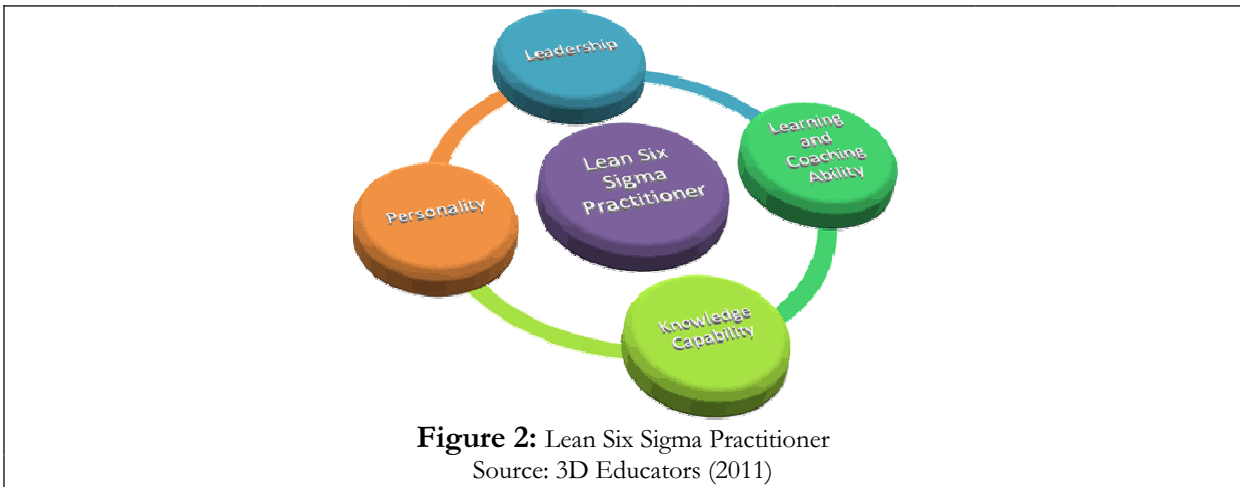
Six Sigma is a disciplined approach to improving product, process and service quality. Linderman et al. (2003) define Six Sigma as an organized and systematic method for strategic process improvement and new product and service development that relies on statistical methods and the scientific method to make dramatic reductions in customer defined defect rates. Six Sigma has evolved significantly and continues to expand to improve process performance, enhance business profitability and increase customer satisfaction. Quality management has been an extremely important management strategy for achieving competitive advantages and improvements. Traditional quality concepts like Statistical Quality Control¹, Statistical Process Control, Zero Defects and Total Quality Management, have been major key players for many years; While Six Sigma is a more recent initiative quality improvement to gain popularity and acceptance in many industries as well as service industries across the world (Hendry and Nonthaleerak, 2005). The basic elements of Six Sigma like Statistical Process Control, Failure Mode Effect Analysis, Gage Repeatability and Reproducibility and there are other tools that have been on reduction of rejects and enhancing the quality. Six Sigma provides a basic framework in which all these tools can be performed with management support (see, Bhargava et al. 2010).



Figure 1: Six Sigma

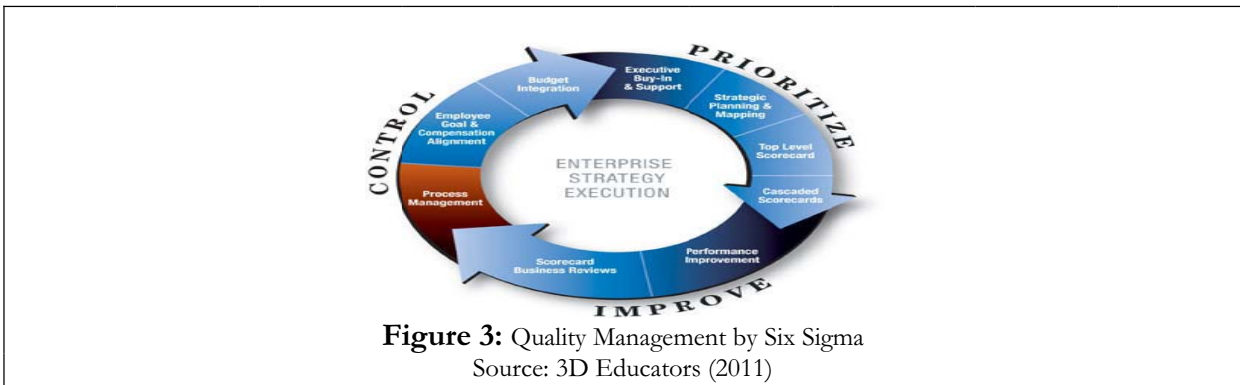
Source: Adapted from the concept of Bhargava et al. (2010)

According to 3D Educators (2011), Six Sigma Green Belt training provides participants with enhanced problem-solving skills, with an emphasis on the DMAIC (Define, Measure, Analyze, Improve and Control) model. Six Sigma Green Belt certification helps the employee serve as a trained team member within his or her function-specific area of the organization. This focus allows the Green Belt to work on small, carefully defined Six Sigma projects, requiring less than a Black Belt's full-time commitment to Six Sigma throughout the organization (see, Figure 2).



3D Educators (2011) further elaborates six sigma models for practitioners (see, Figure 3) on the following points:

- Communicating a business strategy across the organization
- Integrating with Lean Manufacturing, TOC, & other improvement methods
- Applying the DMAIC improvement process
- Selecting successful Six Sigma projects and project teams
- Planning and executing projects
- Significantly increasing profitability through Six Sigma projects
- Selecting the right statistical tools



This study has been carried out at Ufone Franchises in Abbottabad, Pakistan, to find the customer satisfaction using a step-by-step application of the Six Sigma DMAIC (Define–Measure–Analyze–Improve–control) approach to eliminate the defects. This has helped to reduce defects and customer problems at customer service centre of Ufone franchise, Abbottabad. It will eventually lead to improve productivity and on time delivery to customer. The objectives of the study examine the efficacy of Six Sigma quality initiatives in the telecom service quality industry. This paper provides insights into some aspects of the Define, Measure, and Analyze phases of the DMAIC strategy application to selected Ufone franchises. The results find that the

potential for achieving and sustaining lower costs, greater efficiency, reduced cycle times, and overall improved customer care, exists with careful planning and properly executed Six Sigma programs designed for telecom sectors.

This paper is organized in five sections. Section 2 shows a literature review. Section 3 provides data source and methodological framework. The empirical results are presented in Section 4, while the final section concludes the study.

2. Literature Review

Several facets of Six Sigma have been analyzed in the previous researches, with highlights on success factors and possible limitations. In the face of overwhelming voices on the merits and power of Six Sigma, the fact remains that Six Sigma is most effective when an organization already has a firm idea of what forms of products and services are in alignment with the organization's goals and customer expectations. Six Sigma is suited to problems in which the output can be readily measured. The methodology is meant to be implemented by a hierarchy of specially trained personnel—the 'Belts' of various colors. Thus there is now a fast-growing industry of Six Sigma consultants and training programs, with widespread certification activities conducted in an unregulated variety of ways.

According to Harry and Schroeder (1999), six Sigma is a powerful breakthrough business improvement strategy that enables companies to use simple and powerful statistical methods for achieving and sustaining operational excellence. It is a business strategy that allows companies to drastically improve their performance by designing and monitoring everyday business activities in ways that minimize waste and resources while increasing customer satisfaction. The Six Sigma approach starts with a business strategy and ends with top-down implementation, having a significant impact on profit, if successfully deployed. The process improvement methodology that has been used extensively in industry is Six Sigma.

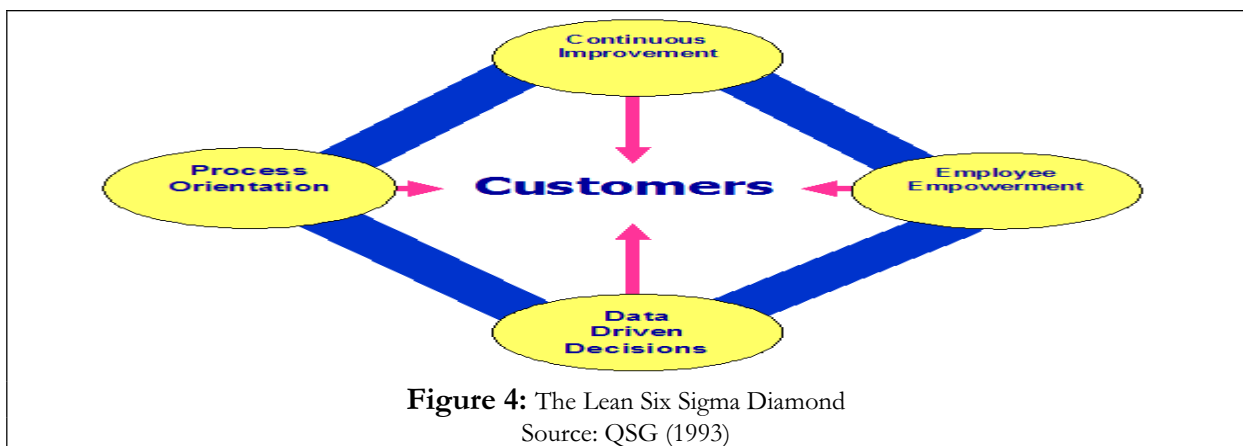
In the Financial Times (Tomkins, 1997), GE explained the Six Sigma quality initiative as "a program aimed at the near elimination of defects from every product, process, and transaction" (p. 29). This continuous improvement concept was introduced at and popularized by Motorola in 1987 in its quest to reduce defects of manufactured electronics products. The basic concept of Six Sigma is a disciplined, quantitative approach for improvements, based on defined metrics, in manufacturing, service, or financial processes.

Hahn *et al.* (1999) describe the Six Sigma initiative and its impact on major corporations like AlliedSignal, GE, Motorola, and Polaroid. They explain the DMAIC process and the major elements of the Six Sigma implementation. They also note that the initial emphasis of Six Sigma was in manufacturing, but now it is being applied in key areas beyond manufacturing and beyond what would traditionally be considered quality. Some of the areas where Six Sigma methodology is being applied are voice of the customer, value chain analysis, customer satisfaction, and financial and banking services.

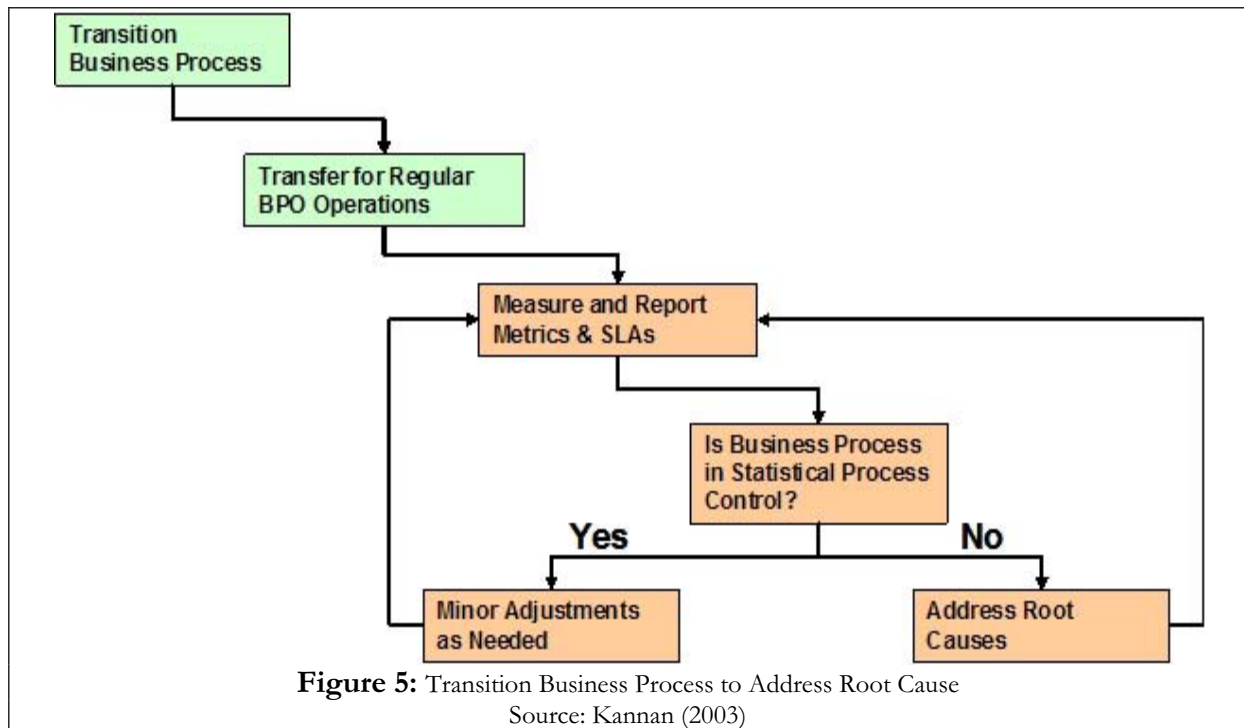
The success or failure of Six Sigma deployment in a business process hinges on selecting projects that can be completed within a reasonable time span (four to six months) and will deliver a tangible (quantifiable) business benefit in financial terms or customer satisfaction. The selection of suitable projects in a Six Sigma program is a major factor in the early success and long-term acceptance of Six Sigma within any organization. According to Adams *et al.* (2003), during black

belt training before project identification is the classic—getting the cart before the horse’. The project selection process must listen to three important voices: the voice of the process, the VOC and the voice of strategic business goals. According to Snee and Rodebaugh (2002), there are four key phases to the development of a mature project selection process: to identify the black belt projects to be worked on in early stages of Six Sigma, to create a Project Hopper (i.e. a collection of projects), to check that the project is linked to the strategic improvement of the organization and to create an improvement system that manages all the improvement efforts of the organization.

Antony (2004) stressed the importance of the following guidelines when selecting any Six Sigma project: a linkage to a strategic business plan and organizational goals; a sense of urgency (how important the project is); the project scope (achievable within four to six months); the project objectives must be clear, succinct, specific, achievable, realistic and measurable; the project selection criteria must be established; the project must have the approval and support of senior management; there must be a focus on CTQ; and project selection should be based on realistic and good metrics (DPMO, yield, process capability, etc.). The aforementioned guidelines also emphasized in the existing literature of Six Sigma. Snee (2005) has drawn attention to barriers in project success and concluded that a common theme of these barriers is that they are all management related. QSG (1993) believe that systemic approaches to business excellence transcend industry boundaries. They also recognize that a deep understanding of a particular industry can be useful for certain types of engagements. Figure 4 shows lean six sigma diamond.



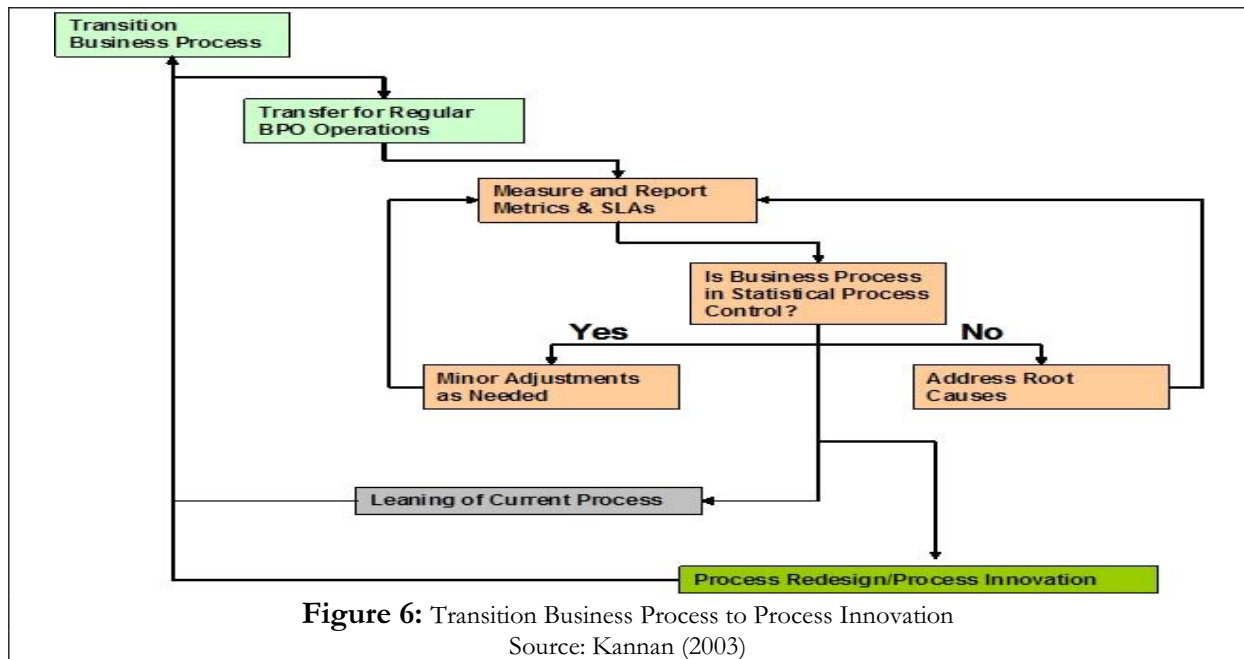
Kannan (2003) examine Leveraging Lean Six Sigma in Business Process Outsourcing. The figure 5 shows the as-is state of most processes under transition from the client to the service provider in the usual outsourcing initiative.



Typical steps in the BPO transition process include:

- i. Process transition. Observing, participating and training in the process; documenting the process and key Critical to Quality (CTQ) or Service Level Agreement (SLA) measures; forming a process team; training the team; and running a pilot effort in parallel to the regular operation of the process.
- ii. Transfer to regular BPO operations group. Once the process team is in place with the BPO service provider and it has been executing the process for a certain period of time, it is transitioned to their operations group for ongoing operations.
- iii. Measure and report SLAs and metrics. BPO contracts may specify SLA measures like average handle time (for phone processes) or network availability (for network management processes). Service providers often measure a number of additional metrics that help them evaluate the performance of their own employees and/or to make sure that the business process is executed well.
- iv. Statistical process control check. Optionally, many service providers make sure that key performance indicators are in statistical process control. If they're in process control, only minor adjustments are made to the process, often necessitated by people turnover or other more minor factors. If KPIs aren't in statistical process control, then root causes may be addressed and adjustments to the process made appropriately.

According to Kannan (2003), the above as-is state of BPO transitions and operations, there's no fundamental innovation or reengineering of the business process. There may be minor adjustments or tweaks, but nothing more. This hardly heralds business transformation in the making. He suggest the to-be state, where the business process is improved continuously using lean Six Sigma (see, figure 6).



The first set of steps are the same as in the as-is state -- process transition, transfer to operations, measure and report SLAs and statistical process control check. Here's what's added.

- **Six Sigma efforts.** These help ensure that the process is in statistical process control whether the process runs as-is or when any fundamental change to the process is implemented. All KPIs need to be stable and in statistical process control! Defects need to be identified and minimized, moving from lower sigma levels towards a Six Sigma level.
- **Process leaning.** This involves a number of tools and techniques that provide continuous improvement to all aspects of a business process -- turnaround time, accuracy, error rates, currency-related effectiveness metrics, customer satisfaction levels and so on. The tools you'll find of value include value stream analysis (making sure that each process step is adding value to the customer and non-value adding steps are completely eliminated or speeded up), failure mode and effect analysis- FMEA (analyzing and minimizing risks due to failure of process steps), service blue printing (analyzing customer touch points and minimizing the chances for making mistakes) and Poke Yoke methods (mistake proofing).
- **Process redesign/innovation.** These flow naturally after an extended period of process leaning and use of Six Sigma. Radical process redesign may not work as well as process innovation and redesign born out of an extended period of deep analysis and understanding of existing processes.

Six Sigma has been widely publicized in recent years as the most effective means to combat quality problems and win customer satisfaction. As a management initiative, Six Sigma is best suited to organizations with repetitive operations for specified outcomes. It aims at preventing non-conformance to defined formats and contents of outcomes, generally identified as defects in products and errors in transactions (Goh, 2002). The success of Six Sigma applications is

reported in terms of sigma levels and the benefits reflected by some financial bottom line. A number of high-profile companies have attributed to Six Sigma the substantial gains in the few years over the turn of the century—coincidentally, also a high-growth period for the broad US economy.

3. Methodology

Six Sigma refers to the philosophy and methods used to eliminate defects in their products and processes or services. A defect is simply any component that does not fall within the customer's specification limits. Each step or activity in a company represents an opportunity for the defects to occur and six-sigma programs seek to reduce the variation in the processes that lead to these defects. Six sigma advocates see variation as the enemy of quality and much of the theory underlying Six Sigma is devoted to dealing with this problem.

Six Sigma approach ensures that the defects and the problems within the system are greatly minimized. Six Sigma also help us identify the problems and measures that can be adopted to reduce these problems or defects.

3.1. Data collection

Four main problems which are identified as:

- i. To identify the overall problems in the customer service centre.
- ii. To identify the problems faced by the existing customers of Ufone at customer service centre.
- iii. To identify problems faced by new customers in the system.
- iv. To identify the problems faced by the customers of Ufone in customer service centre. A sample of 100 customers was taken who represented the overall population. A questionnaire has been used with 5 main problems associated with customer service:
 - a. Staff cooperation
 - b. Skills of the staff
 - c. Time taken to solve the problems
 - d. Guidance provided by the staff
 - e. Customer's satisfaction of the student affairs service.

The sixth question was about their personal opinion about any other problem that they might have faced with the customer care service. The questions were dichotomous in nature that is in the form yes or no. the questions were created in such a manner that checking the option 'no' referred to the problem. The actual questionnaire is attached to the index in the end.

4. Results and Discussion

The results of the questionnaires are given in Table 1 below:

Table 1: Customers' Responses

Questions	Responses in NO %	Responses in YES %
Cooperation	50	50
Skill	50	50
Time	90	10
Guidance	40	60
Satisfaction	60	40

The above table shows the percentage of the responses as provided by the respondents. Respondents rate the cooperation and skills 50% each in both 'yes' and 'no' column. However, respondents are strictly rate the time element i.e., 90 percent say 'no' response and 10 percent say 'yes' responses. Forty percent respondents not satisfy the proper guidance provided by the Ufone franchisers. To represent the responses with 'no', in the Pareto chart, the scale of 0-10 points was selected (shown in the table 2).

Table 2: Occurring Scale

Problems	Occurring scale
Cooperation	5
Skill	5
Time	9
Guidance	4
Satisfaction	6

To find out the problems with the existing customers, a separate survey was conducted. A sample of 100 customers was taken. The ratio of male and female customers was kept constant. The survey was conducted carefully and respondents were asked to fill the questionnaires in the supervision and guidance of the group members in order to avoid any errors. The questionnaire had 10 different questions and all the questions represented a problem that can be or is encountered by the customers in the customer service centre. The questionnaire was designed in such a manner that the responses 'yes' showed the problem. The percentage of the respondents

of said yes or no was calculated. On the basis of that percentage a scale was created from 0-10 which showed the intensity of the problems, 0 being the least problematic and 10 being the most problematic issue. Pareto chart for problems was made on the basis of this scale. Following is the Table 3, which showed the percentage of responses as given by the respondents from various departments.

Table 3: Ufone various Departments

Questions	Reponses in YES %	Responses in No %
1. Customers ignored	40	60
2. Busy in office work	66	34
3. Early wind up	23	77
4. Illegitimate advantage of seniors and females	66	34
5. Slow service	43	57
6. Customer biasness	63	37
7. Busy in other activities like phone calls etc.	80	20
8. Asking customers to come back later	50	50
9. Technical problems	2	98
10. Lack of quick responses.	57	43

Following Table 4 represents the scale of degree of problems used for the Pareto chart 2.

Table 4: Degree of Problems

Problem	Occurring scale
1. Customers ignored	4
2. Busy in office work	6.6
3. Early wind up	2.3
4. Illegitimate advantage of seniors and females	6.6
5. Slow service	4.3
6. Customer biasness	6.3
7. Busy in other activities like phone calls etc.	8

8. Asking customers to come back later	5
9. Technical problems	0.2
10. Lack of quick responses.	4.3*

**here in the 10th question 'No' response represents the problem. That's why scale 4.3 converted from 43% is taken.*

To identify problems of the new customers in the system another questionnaire was designed which contained questions regarding the problems that might be faced by the new customers on first entering the centre. The questionnaire had 5 main problems written in the form of questions, these problems were:

- a. Presence of staff
- b. Directions needed
- c. Consulting more than 1 person in centre
- d. Revisiting centre
- e. Customer satisfaction.

Following are the Table 5 that shows the responses of the students.

Table 5: Students' Perspective

Problems	Responses in YES %	Responses in NO %
1. Presence of staff	100	0
2. Directions needed	80	20
3. Consulting more than 1 person	20	80
4. Revisiting customer service centre	80	20
5. Customer's satisfaction	80	20

Table 6 representing the scale of degree of problems used for the Pareto chart 3.

Table 6: Scale of Degree of Problems

Problem	Occurring scale
1. Presence of staff	0
2. Directions needed	8
3. Consulting more than 1 person	2
4. Revisiting customer service centre	8
5. Customer's satisfaction	2

Six sigma techniques have been used in this study. Pareto chart is a technique that plots the problem in a graph. The problems are plotted against a scale of intensity e.g. in our study the scale set was 0-10. 0 is the least intense and 10 being the most intense value of problem. These charts help to breakdown a problem into the relative contributions of its components. They are based on the common empirical finding that a large percentage of problems are due to small percentage of causes.

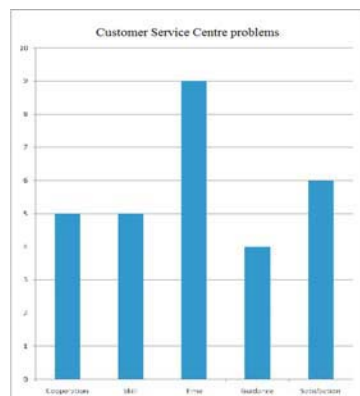


Figure 7: Pareto Chart 1

The Pareto chart in Figure 7 shows the level of problems in the customer service centre. Problems were classified in 5 main categories which are:

- Cooperation of the staff
- Skills of the staff
- Time taken to solve the problem
- Guidance provided
- Customer Satisfaction

A sample of 100 customers was taken. The frequencies of these problems are:

- Cooperation: 5
- Skill: 5
- Time: 9
- Guidance: 4
- Satisfaction: 6 Out of 10

These frequencies are then plotted in the graph which represented the data in the form of the chart. The chart shows that the major problem in the customer service centre encountered by the customers is the time taken to solve the problem with the maximum value of 9; second major problem is the customer's satisfaction of the service of centre with the value of 6 out of 10. Some

customers have mentioned that their problem persisted even after visiting the centre. Then staff cooperation and skills required are needed to be addressed. Both of these had a value of 5 each. Last problem was the guidance needed by the customers, with the value of 4 out of 10.

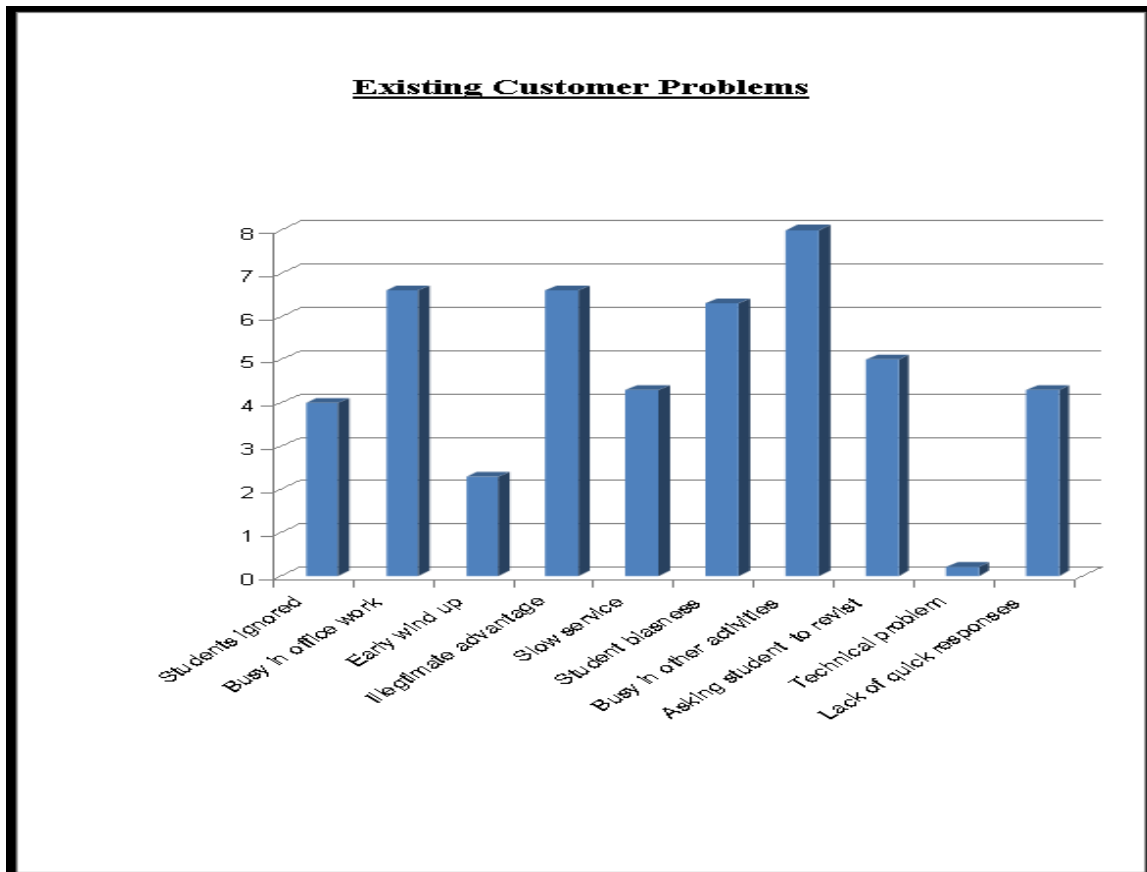


Figure 8: Pareto Chart 2

Figure 8 shows the problems of the existing customers in the customer service centre, usually for matters like network problems, sim registration problems, billing issues, sim blocking issues, etc. In the chart there are 10 main problems shown along with their intensity. The chart clearly shows that the main problems that the customers are having is that the staff is usually busy in other activities with the scale of 8 out of 10. Following this are the problems, like, busy in office work and illegitimate advantage of seniors and female customers. Round 63 percent customers said that there is biasness i.e. the staff prefers those who are known to them or the ones with references etc. At the scale of 5 which shows a moderate level problem is that the customers are asked to come back later for the problem. This causes delay and cause customers to wait. Slow service and lack of quick responses at the intensity scale of 4.3 which means these issues also need attention although it's not a big problem but the six sigma approach refers that even the slightest of the problems should be eliminated. Next is the problem that customers that are waiting in line are sometimes ignored by the staff. This problem can be eliminated if problems like busy in other activities, office work, staff biasness will be addressed. Lastly the

technical problems such as problems in computer, databases etc are the least intense with the ranking of only 0.2 which is almost negligible.



Figure 9: Pareto Chart 3

Figure 9 shows the problems associated with the new customers that visit the customer service centre for the first time. These customers have to wait for a while to get new connections. The above chart shows that the problem relating staff presence is equal to zero i.e. the staff is on the desk at all times. After that it's been noted and the chart proves that customers require additional guidance and directions for smooth service availability. This is one of the main problems that centre needs to address. Similarly revisiting service centre also stays on top at frequency of 8.

The chart basically shows that problem of providing proper guidance and direction to customer should be addressed immediately. By fixing these problems the service rate and the overall service of the customer service centre can be improved to a great degree.

5. Summary and Recommendations

The objective of the study is to measuring and analyzing customer satisfaction in Ufone franchise in Abbottabad, KPK province of Pakistan by using six sigma applications. The results of Pareto chart shows that there are number of problems which are facing by the existing customers in the customer service centre i.e., network problems, sim registration problems, billing issues, sim blocking issues, etc.

On the basis of certain findings, there are some recommendations for Ufone franchise for better complacence and customers' satisfaction i.e.,

- i) Cooperation of the staff is very important especially in this kind of sector where the whole business entirely depends upon customer's positive feed-back and satisfaction level, as many other alternatives can easily be obtained.
- ii) Customer service center's staff should be enough trained so that they can better deal customers according to their specific problems. There should be minimum response time to customer's problems. This can again increase the credibility of Ufone service as compared to other cellular networks.

- iii) Enough guidance needed to be provided to the new as well as existing customers. This will lead more customers' satisfaction and more usage of the service.
- iv) Staff of customer service centre should be available for guidance and help, this can increase customer trust on the reliability of the centre and quality of services can also be enhanced.
- v) Customer service centre can follow six sigma approaches to manage their existing customers as well as attracting new ones. This will not only improve their process but will also lead to strong customer base and financial benefits.

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