Analysis of factors affecting the customer satisfaction level of public sector in developing countries: an empirical study of automotive repair service quality in Pakistan

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Abstract

This paper aims to investigate the factors which mainly affect the customer satisfaction level of automotive repair service quality being provided by the public sector organizations in Pakistan. A questionnaire was designed to measure the gap between the customer expectations and satisfaction about repair service quality. A total of 183 managers, supervisors and operators randomly selected from 100 customer organizations (public sector) responded to the questionnaire. Randomly collected data analyzed using software SPSS 19, Minitab 15, Six Sigma Techniques of Measurement System Analysis, Affinity Diagram,

Pareto Analysis, SIPOC Analysis, Cause and Effect Matrix and Scatter plots. The authors found that the timely availability of resources, technician's skill level and efficient fault diagnosis has significant impact on the service quality. This study provides good guide lines to public sector automotive repair service providing organizations to concentrate in these areas for the best satisfaction of their customers.

Keywords: Public Sector Automotive Organizations, Customer Satisfaction, Resource Availability, Technician's Skills, Efficient Fault Diagnosis.

Introduction

Pakistan came into being about 63 years ago but still its more than 60% population has very stumpy daily income. Sarwar et al, (2010) believe that one of the basic reason of economic instability is the poor performance of different state institutions particularly the public sector. The public sector losses of Pakistan are enormous and a major cause of slow growth. Public sector automotive manufacturing and service industry is worth in billions of rupees. Public sector hews a huge portion of Pakistan's budget due to its inefficiency and ineffectiveness. Automotive industry throughout the world has flourished enormously. Productivity analysis of this industry shows that they have added a lot to the GDP of respective countries. In recent times the importance of the services sector has increased all around the world and it emerged as the main driver of economic growth around the world. Pakistan has also seen a major transformation in the economic structure and the share of the services sector has risen to 53.8 percent in 2008-09. The services sector grew by 3.6 percent and made a contribution of 96 percent to the GDP growth. The services sector has been an important contributor to Pakistan's economic growth over the past five years by growing at an average of 6.6 percent annually since 2003-04. Service industry is growing rapidly in

Pakistan and has major share 13.66% after agriculture 44.65% of labour employment (Pakistan Economic Survey, 2007-08).

Parasuraman, Zeithaml and Berry, (1994) and Gupta and Chen, (1995) believe that service quality is one of the major issues facing operations managers but it is an area characterised by debate concerning the need for assessing customer expectations and service quality assessment. Gomeza, McLaughlinb and Wittinkc, (2004) identified that customer satisfaction (CS) plays a key role in a successful business strategy. Public sector service dimensions are somewhat different from private sector as they are not threatened by the competitors and hence lacks in continuous improvement through competitive strategy. Gento et al, (2001) says that quality is generally transparent when it is present, but easily recognised when it is absent If service quality is to be the cornerstone of any organisation's strategy, there must be a means of measuring it (Curry and Herbert, 1998). Many different methods exist to measure, control and improve quality in various areas. It would be helpful if quality was an easily defined and unambiguous concept. Unfortunately, quality is hard to define and often difficult or impossible to measure. Hayes, (1997) states that some quality dimensions are generalised across many services, but some will apply only to specific types of services, and it is necessary to understand quality dimensions to be able to develop measures to assess them. There are two ways of identifying important quality dimensions of services: quality dimension development approach and critical incident approach. The first extracts information from literature and second obtains information from customers. This paper used the second method to obtain information from customers.

In this study, efforts were made to search for the factors that significantly affect "Service level" and "Customer Satisfaction" of public sector automotive repair organizations as less of the research has been carried out on the operational procedures and productivity improvement of this industry.

Scope

The scope of this study is limited to automotive repair service quality being provided by the public sector organizations (service providers) to public organizations (service receivers) in Pakistan. Primarily data was collected from a sample of 183 participants (Managers, Supervisors and Operators) randomly selected from 100 public sector organizations located in all over Pakistan. Almost 300 automotive repair organizations are located almost in every part of the country responsible for provision of automotive repair support to public organizations located in their respected area of responsibility. Almost 2000 user organizations are dependent on these automotive repair units. James et Al, (2001) suggest that a sample size of 183 is sufficient to measure the customer satisfaction.

Brainstorming sessions were conducted initially with selected customer representatives to find out about their expectations, which were then transformed into questions and distributed randomly in the final questionnaire to minimize the effect of bias. Data was collected randomly and analysed using six sigma techniques. Reliability of the measurement system was confirmed with the help of Measurement System Analysis. Pareto Analysis was used to distinguish between a vital few and many trivial factors. Cause and Effect Matrix, Scatter Plots and Pearson Coefficient of correlation were used to further filter out the most critical factors. All data were analyzed with the help of SPSS 19 and Minitab 15.

Customer Service Quality Indicators

An affinity diagram as used by Crow, (2006) and Babbar, Behara and White, (2002) was used to organize parameters to evaluate customer expectations in broader categories. The data collection was carried out in two stages. The first was a pilot test with a sample of 30 respondents, to clarify the overall structure and approach to the research. Problems of misinterpreting questions observed in the pilot stage helped in improving the questionnaire in

both structure and substance. Finally, questionnaire was modified on the basis of pilot study feedback by the researchers for final survey. Confidentiality and anonymity were ensured. Following were investigated in relation with service quality dimensions:

- Competence level of technicians in diagnosing the faults and carrying out accurate repair jobs.

- Feeling of ease and confidence when the damaged equipment is overtaken by workshop staff for repair.

- Dependable repair and maintenance support.

- Operational Reliability of repaired vehicles.

- Recurrence of same faults.

- Average time spent by workshop to repair the vehicles.

- Average time after which the vehicle goes back to the workshop for repair / maintenance.

- Personal interest by service managers in repair activities.

- Convenient operating timings.

- Access to service managers and staff.

- Attitude of Workshop staff.

- Workshop staff turnout.

- Availability of up-to-date workshop equipment and tools.

- Availability of adequate spares / resources to complete repair tasks.

- Accurate record keeping.

- Amount of paper work involved.

- Refreshment arrangements for operators accompanying the under repair vehicles.

- Visually appealing workshop facilities and layout.

Data Collection

To check customer service quality satisfaction, a questionnaire was used to collect the data. Two scales were used with five points each to rate the expectations and satisfaction level. These items were measured using 5-point Likert Scale for importance, 1 = does not matter, 2 = less important, 3 = normal, 4 = important, and 5 = very important and for satisfaction measurement, 1= highly unsatisfied, 2= unsatisfied, 3= normal, 4=satisfied and 5=highly satisfied respectively.

A total of 183 managers, supervisors and operators randomly selected from 100 customer organizations (public sector) responded to the questionnaire. Two surveyors were trained to interview the respondents. They interviewed three different customers denoted as A, B and C (see Figure 1) three time each with a gap of two days between every session to check their repeatability and reproducibility errors. Point E and F (see Figure 1) are the mean student satisfaction level for nine interviews respectively for surveyors 1 and 2. Mean satisfaction of nine interviews for each surveyor was calculated. Line EF connects the two mean points. It is evident that surveyor 2 is more accurate and the difference of less than one per cent between point E and F shows that both surveyors understood in a similar manner. Data obtained from these sample customers were analysed in Minitab 15. A variation in results due to repeatability and reproducibility error contributed 8.86 per cent, which is less than the normal range of nine per cent defined by AIAG. Variations of these surveyors were then compared against a standard range as defined by Automotive Industry Action Group, (2002). Data collection through interviews took three months. Average satisfaction level of the customer using SPSS 19 based on the above mentioned factors was calculated and average customer satisfaction index was found to be 70.98 per cent.

Results, Analysis and Discussion

Among the respondents, it was found that 23 % (n=42) were managers, 33.3% (n=61) were supervisors and 43% (n=81) were operators. It may be noted that operators represented the largest percentage of the respondents as they are the actual users who directly interact with the automotive repair organizations. The results of descriptive statistics indicated general disagreement of the respondents to the satisfaction level. The mean satisfaction value 3.549 ranged from highest 4.63 to lowest 2.08). The results for supervisors indicated highest concurrence (Mean = 3.5796, Standard Deviation = 0.5658); operators (Mean = 3.5706, Standard Deviation = 0.4869) and for the managers (Mean = 3.462, Standard Deviation = 0.5290) respectively. The mean score and standard deviation reflected respondents satisfaction level is above normal but below than satisfaction level of service being provided by the repair organizations.

Pareto analysis as suggested by Karuppusami and Gandhina, (2006) and Geilen et al. (2005) was used to separate a vital few aspects from the trivial many. In the present study any of the two points highly unsatisfied and unsatisfied on the designated five points scale were considered a complaint. The total numbers of complaints each against question were counted. Subsequently these complaints were arranged and plotted in the same descending order. (see Figure 2). The x-axis represents the type of question, whereas the y-axis shows the frequency of complaints against that particular question. The vertical distance between point A and x-axis is divided into 100 equal parts. The horizontal line is drawn starting from the point of 80% to cut the cumulative line at point B. A vertical line was drawn from point B to intersect the x-axis at point C, thus leaving some questions on its right and left side of point C, 13 complaints located on the left side of the line B-C created 80% dissatisfaction amongst the customers whilst the remaining 5 created just 20%.

SIPOC (supplier, input, process, output, and customer) diagram (see Table 1) presents the key performance input variables (KPIVs) and key performance output variables (KPOVs) of the 13 complaints as listed in the process column (Miles, 2006 and Aken et al, 2005). The KPIVs indicate the effect of the corresponding process, whilst the KPOVs indicate any change in the respective process. Suppliers are responsible for creating KPIVs and customers are the stakeholders.

Cause and Effect (C&E) Matrix, (see Table 2) based on the outcome of SIPOC analysis was constructed (Sokovic, Pavletic and Fakin , 2005) and (Rotshtein, Posner and Rakytyanska, 2006). It indicates the KPOVs, which have the strongest link with the thirteen KPIVs along with those KPIVs capable of creating maximum effects. KPOVs of the thirteen KPIVs are listed in the fourth row whilst corresponding inputs are in the second column. For each KPIV, an average importance given by the customer from real data is calculated, as given in the first row. To correlate KPIV and KPOV a ranking scale is assigned as follow:

No Correlation	Remote Effect	Moderate Effect	Strong Effect
0	1	3	9

Appropriate correlation values (see Table 2) are shown. Summations of the cross multiplication of each correlation value and its respective average priority are written in the last row and in the last column for outputs and inputs respectively. It indicates that increased customer satisfaction is the best indicator for noticeable changes in the KPIVs with 353 points and three KPIVs of skilled technicians; efficient fault diagnosis and availability of

adequate resources with respective total points of 294.9, 262.1 and 256.5 are the major contributor towards maximum changes in the customer satisfaction.

The relationship between the three complaints and customer satisfaction was verified with the help of relationship charts (see Figure 3 a, b & c) plotted on the similar scales (Rizwan, Alvi and Hammouda, 2008). The vertical axis represents the customer satisfaction level of the whole questionnaire, whilst the horizontal axis shows the corresponding satisfaction level of three relevant individual questions. A regression line was plotted to represent the mean values. Significant positive relationships were observed between customer satisfaction and the three complaints. It implies that any change in those inputs will result in a reciprocating change in the customer satisfaction.

Also, the strength of the relationship between the three complaints and customer satisfaction was evaluated with Pearson correlation coefficient (see Table 3) and respective coefficient values were found significant (p value<.01):

- Availability of adequate resources   0.713

- Skilled technicians   0.667

- Efficient fault diagnosis   0.583

This reflects that the availability of adequate resources have the strongest influence on the customer satisfaction. The present study is based on samples from Pakistan and can be useful for developing countries with similar quality cultural traditions. However, developing countries with different quality culture can also benefit because of the commonality of automotive repair activities.

Conclusion

On the basis of the surveyed sample, it is concluded that availability of sufficient resources (financial and equipment / spare parts), skilled technicians and efficient fault diagnosis are influencing parameters affecting customer satisfaction. It is evident from the results that all these factors are interlinked and contribute towards service productivity improvement. Future research can be done to further analyse those factors, which specifically deal with the requirement and availability of resources. Then efficient resource distribution strategies can be developed as availability of resources in terms of finances and technical equipment provide strong base to meet the customer expectations which will result in higher customer satisfaction.

TABLE 1
SIPOC DIAGRAM

SUPPLIER	INPUT	PROCESS	OUTPUT	CUSTOMER
Finance Department	Arrangement of necessary funds for the provision of Spares and allied materials	Availability of Adequate Resources	Speedy and Quality Repair Work	User organizations
Information Technology Department	Automation of repair records	Amount of Paper Work Involved	Minimum paper Work	Workshops / Customer organizations
Training and central spares procurement Department	Skilled technicians and Quality Spares	Minimum Recurrence of Same Fault	Elimination of fault recurrence	Customer organizations
Skilled technicians	Efficient fault diagnosis and rectification	Reduction in average Time to Repair the Equipment	Increased Customer Satisfaction	Customer organizations
Central repair equipment procurement authority	Arrangement for the provision of Tools and Equipment	Availability of up to Date Equipment	High Productivity	Workshops / Customer organizations
Human resource development Department	Up to date training	Technicians Competence Level	Competent technicians	Workshops
Automotive Repair Workshops	Quick Repair response	Dependability of Repair Support	Increased Customer confidence	Customer organizations
Automotive Repair Workshop management	Improved Repair practices	Reliability of Repaired Equipment	Reliable Repairs	Customer organizations
Automotive Repair Workshops management	Provision of refreshment facility	Administrative Arrangements for Customer	Delighted Customer	Customer organizations
Customer relations manager	Customer Service Training	Attitude of Workshop Staff	Improved working relationships	Customer organizations
Quality assurance and quality control department	Quality Assurance and Control of Repair activities	Reduced Mean Time Between Failure	Reduced workload and Increased operational time of Equipment	Customer organizations
Human resource development department	Professional attitude	Personal Interest of workshop Managers	Increased efficiency	Workshops / Customer organizations
Automotive repair workshop management	Availability of Managers on workshop floor and Professional attitude	Access to Workshop Managers	Enhanced Communication	Workshops / Customer organizations

TABLE 2

CAUSE AND EFFECT MATRIX BETWEEN INPUTS AND OUTPUTS

customer importance	4.3	3.6	3.7	3.8	4.5	4.4	4.1	4.2	3.7	4.0	3.8	4.3	4.0	
	Process Outputs (KPOVs)													
Process Inputs (KPIVs)	Speedy and Quality Repair Work	Minimum paper Work	Elimination of fault recurrence	High Productivity	Increased efficiency	Competent technicians	Increased Customer confidence	Reliable Repairs	Delighted Customer	Improved working relationships	Reduced workload and Increased operational time of Equipment	Increased Customer Satisfaction	Enhanced Communication	Total
Arrangement of necessary funds for the provision of Spares and allied materials	9	0	3	9	9	0	9	9	1	1	3	9	0	256.5
Efficient repair procedures and automation of repair records	3	9	0	3	3	0	1	3	1	1	3	9	0	144.8
Skilled technicians	9	0	9	9	9	3	9	9	3	0	3	9	0	294.9
Efficient fault diagnosis and rectification	9	0	9	9	3	1	3	3	3	1	9	9	0	236.6
Arrangement for the provision of Tools and Equipment	3	0	0	3	3	0	1	1	0	0	3	3	0	70.3
Up to date training	3	0	3	3	3	9	1	3	3	0	1	3	0	132.5
Quick Repair response	3	0	0	9	3	0	9	1	3	9	1	3	0	165.5
Quality of spares	3	0	3	9	3	0	3	9	3	1	3	9	0	186.5
Provision of refreshment facility	0	0	0	0	0	0	1	0	9	3	0	0	3	61.7
Customer Service Training	0	1	0	3	1	0	3	0	3	9	0	0	9	115.2
Quality Assurance and Control of Repair activities	3	0	3	3	9	0	3	9	3	3	9	9	0	221.2
Professional attitude	3	0	3	9	3	1	3	3	3	1	3	9	0	165.9
Availability of managers on workshop floor and Professional attitude	3	0	3	9	3	1	3	3	3	3	3	9	9	210.1
Total	222	36	132	296	232	65	200	220	142	128	154.5	348	84.3	

TABLE 3

CORRELATIONS CHART

	Customer satisfaction	Availability of adequate resources	Technicians skills	Efficient fault diagnosis / rectification
Customer satisfaction	1	**.713**[**]	**.667**[**]	**.583**[**]
Availability of adequate resources	**.713**[**]	1	.475[**]	.391[**]
Technicians skills	**.667**[**]	.475[**]	1	.400[**]
Efficient fault diagnosis / rectification	**.583**[**]	.391[**]	.400[**]	1

**. Correlation is significant at p value less than 0.01 level (2-tailed).

FIGURE 1

SATISFACTION LEVEL OBSERVED BY SURVEYOR 1 AND 2 AS A RESULT OF
QUESTIONING CUSTOMERS A, B AND C
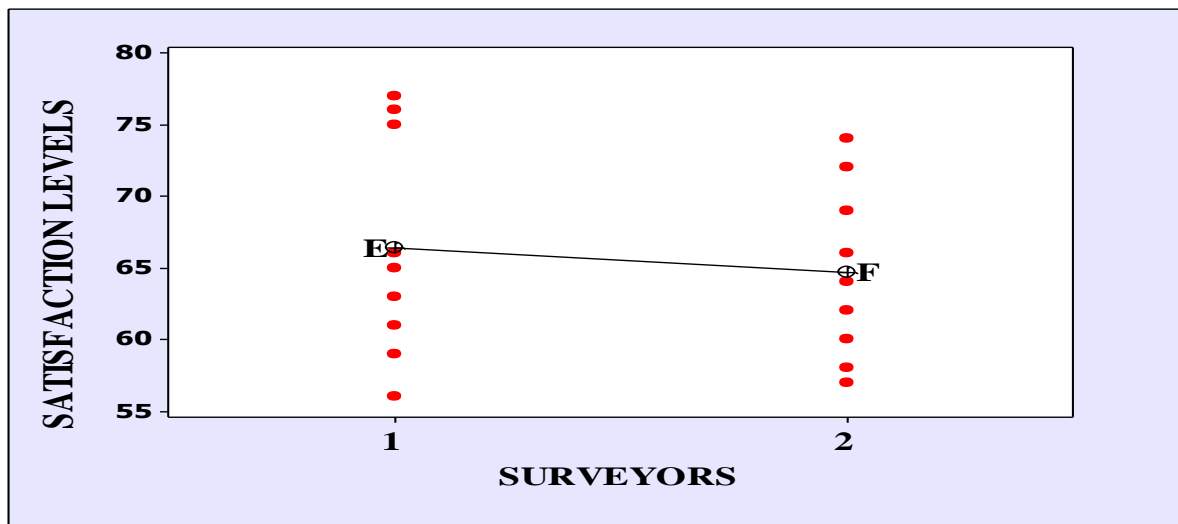
FIGURE 2

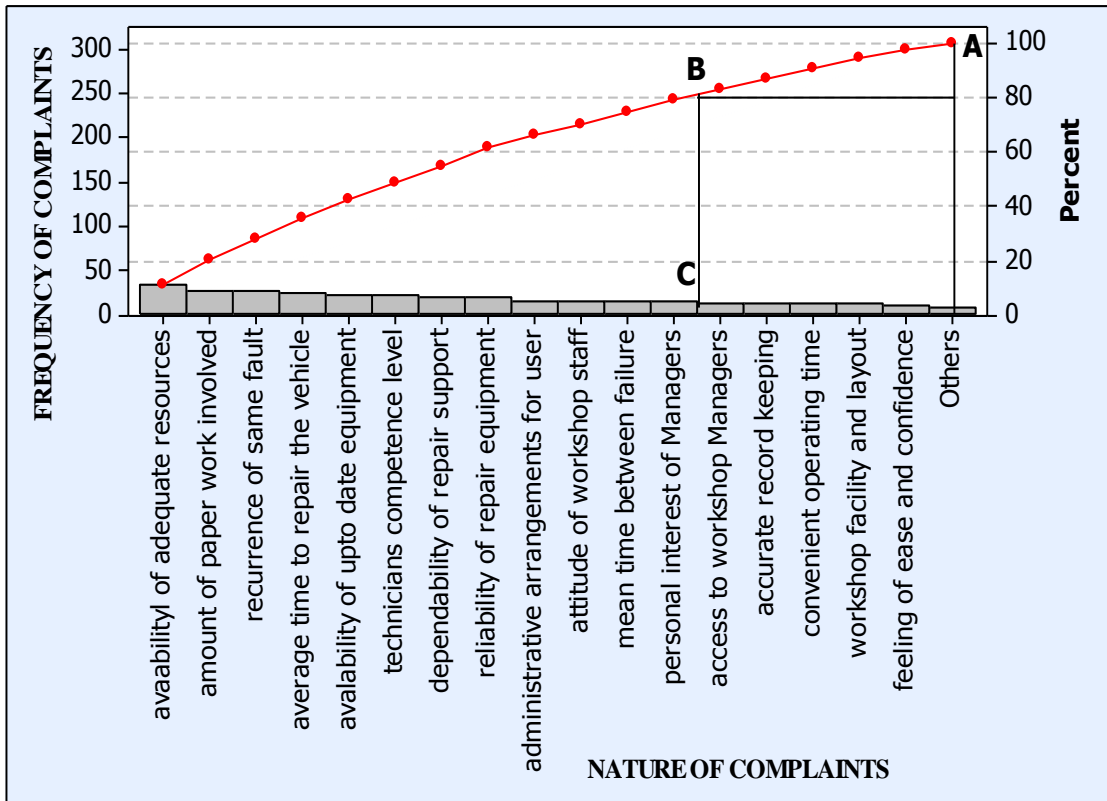PARETO CHART: NUMBER OF COMPLAINTS AGAINST THE NATURE OF COMPLAINTS.

FIGURE 3-A

RELATIONSHIP BETWEEN CUSTOMER SATISFACTION AGAINST AVAILABILITY OF ADEQUATE RESOURCES
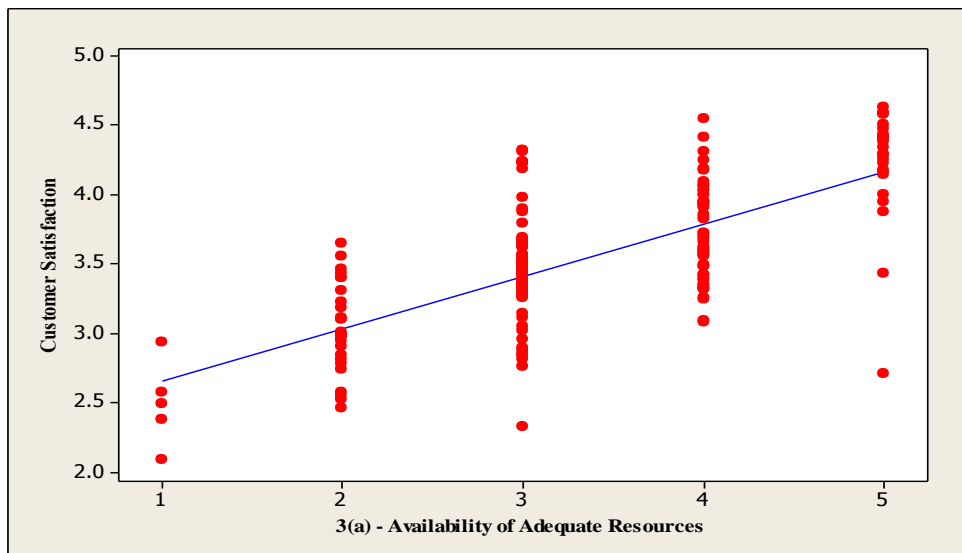
FIGURE 3-b

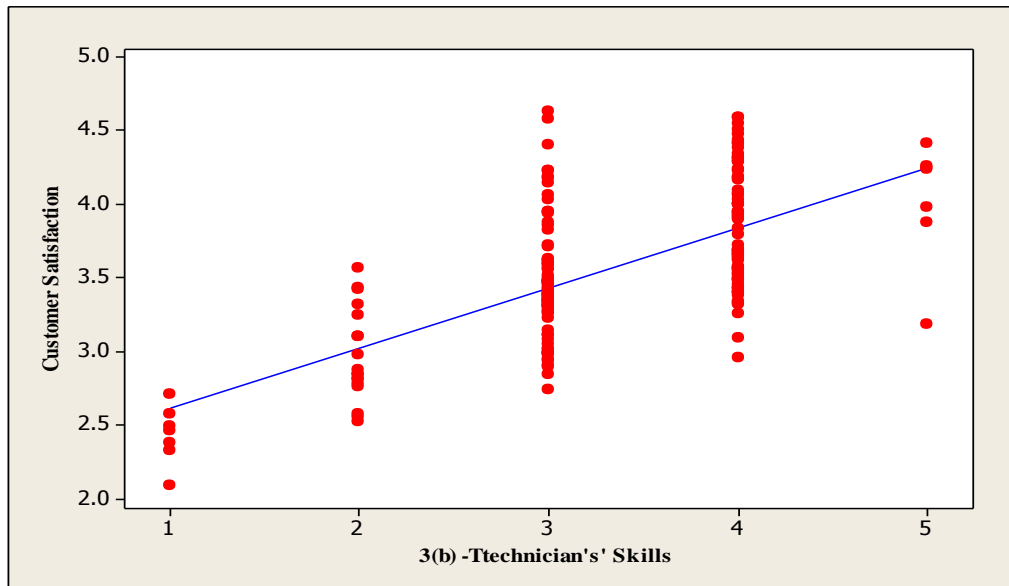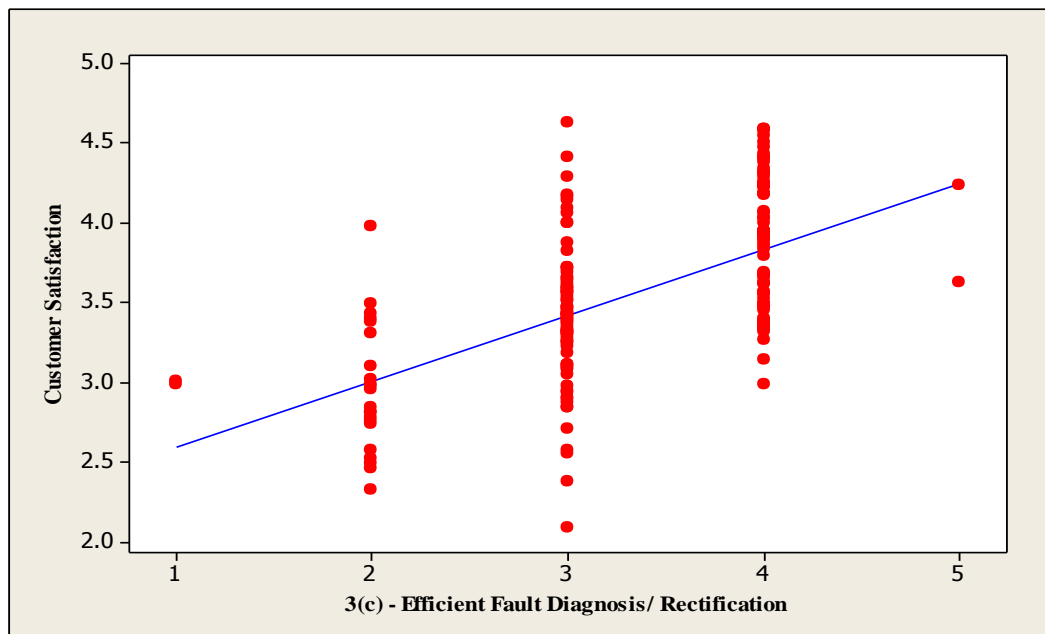RELATIONSHIP BETWEEN CUSTOMER SATISFACTION AND TECHNICIAN'S

SKILL

FIGURE 3-c

RELATIONSHIP BETWEEN CUSTOMER SATISFACTION AND EFFICIENT FAULT

DIAGNOSIS / RECTIFICATION

References

1. Angel M. Gento, M a Dolores Minambres, Alfonso Redondo t, M a Elena Perez (2001). QFD Application in a Service Environment: A New Approach in Risk Management in a University, Operational Research. An International Journal. Vol. 1, No2 pp. 115-132 115.

2. Automotive Industry Action Group (AIAG) (2002). Management System Analysis Reference Manual, Chrysler Ford, General Motors Supplier Quality Requirement Task Force.

3. Alexander P. Rotshtein, Morton Posner, Hanna B. Rakytyanska (2006). Cause and Effect Analysis by Fuzzy Relational Equations and Genetic Algorithm, Reliability Engineering and safety, 91(9), pp. 1095-1101.

4. A. Rizwan, M. S. Alvi, M. M. I. Hammouda (2008). Analysis of the Factors Affecting the Satisfaction Level of Engineering Students, Int. J. Engg Ed, vol.00, No, 0, pp1-6

5. Curry, A. and Herbert, D. (1998). Continuous Improvement in Public Services – A Way Forward. Managing Service Quality vol. 8 (5), 339-349.

6. D. Sokovic, Pavletic, S. Fakin (2005), Application of Six Sigma Methodology for Process Design , J. Processing Technology, 162-163, pp, 777-783.

7. Eilen M. Van Aken, Greet Letens, Garry D. Coleman, Janifer Farris, Drik Van Goubergen (2005). Assessing Maturity and effectiveness of enterprise performance measurement systems, Int, J. Productivity and performance management, 54(5/6), pp 400-418.

8. Elizabeth N. Miles (2006). Improvement in The Incident Reporting and Investigation Procedures using Process Excellence Methodology, Journal of Hazardous Materials, 130(1-2), pp, 169-181.

9. Gupta, A. and Chen, I (1995). Service Quality: Implications for Management Development. International Journal of Quality and Reliability Management, Vol. 12, No. 7, pp. 28-35.

10. G. Karuppusami, Gandhina, R (2006). Pareto Analysis of Critical Success Factors of total Quality Management: A literature Review and analysis, The TQM magazine 18(4), pp 372-385.

11. Hayes, B.E (1997). Measuring customer satisfaction – survey design, use, and statistical analysis methods. Milwaukee, WI: ASQ Quality Press.

12. James E. Bartlett, II, Joe W. Kotrlik and Chadwick C. Higgins (2001), Organizational Research: Determining Appropriate Sample Size in Survey Research, Information Technology, Learning, and Performance Journal, Vol. 19, No. 1, p 43 – 50.

13. Kenneth Crow, Affinity Diagrams, (2006). http://www.npd-solutions.com/affinitydiagram.html

14. Miguel I. Gomeza, Edward W. McLaughlinb, Dick R. Wittinkc (2004). Customer Satisfaction and Retail Sales Performance: An Empirical Investigation, Journal of Retailing 80 265–278.

15. Marc Geilen, Twan Basten, Bart Theelen, Ralpotten (2005). An Algebra of Pareto points, Fifth International Conference on Application of Concurrency to system Design (ASCD) pp, 88-97.

16. Pakistan Economic Survey, (2007-08). Ministry of Finance, Pakistan.

17. Parasuraman, A., Zeithaml V. A., Berry L. L (1994). Servqual: Alternative Scales for Measuring Servicec quality? A Comparative Assessment Based on Psychometric and Diagnostic Criteria, Journal of Retailing, Vol. 70, No. 1, pp. 193-199,.

18. Sunil Babbar, Ravi Behara and Edna White (2002), Mapping product usability, Int. J. Operations and Product Management, 22(10), pp. 1071-1089.

19. Sheikh Zahoor Sarwar, Nadeem Ehsan, Ibtisam Mirza, Javed Latif Paracha, Mehad Azeem, Azam Ishaque (2010). Barriers of Productivity in Public Sector Automotive Manufacturing Industry of Paksian, World Academy of Science, Engineering and Technology, 65.