

Modelling Service Quality Issue in Management Education: Taguchi's Robust Design Approach

Roma Mitra Debnath
Fore School of Management,
B-18 Qutab Institutional Area
New Delhi: 110 016, India
E-mail: roma@fsm.ac.in, mitra_roma@rediffmail.com

Ravi Shankar*
Department of Management Studies,
Indian Institute of Technology Delhi,
Viswakarma Building,
Hauz Khas, New Delhi-110016, India
E-mail: ravil@dms.iitd.ernet.in, r.s@rediffmail.com

ABSTRACT

It is generally accepted that higher education plays an important role in updating the knowledge and skills. India is witnessing a major change in the field of higher education. Management education has become quite popular in India and recently it has expanded very rapidly. However, the quality of the management education is being debated in literature as well as in society. Continuous social and political changes are having an impact on quality in management education. Student's satisfaction is one of the most important issues in deciding the policy of an education system. This is measured by comparing the expectation and related deliverables to the students. This paper attempts to identify the important issue/parameters, which are affecting the satisfaction of the management students. Applying Taguchi's robust parameter design, experiments are conducted with $L_{54}(2^1 \times 3^{25})$ orthogonal array to reveal the main factors. Analysis of Variance (ANOVA) is further applied to identify the contribution of significant factors. The result brings out important factors for the effectiveness of management institutions.

Key words : management educations, Student's satisfaction, Taguchi's robust parameter design, India.

1. Introduction

Management education programme is very popular in both developed and developing countries all over the globe. An MBA degree has become so popular that it is now almost a necessity for good career in management. Higher education is generally designed to make students to learn the body of knowledge into the theoretical framework but higher education in management is relatively more practice oriented. Management education has served

a major purpose to the industries worldwide with a focus on developing managerial skill to handle the complexities of decision-making process. There have often been discussions on the quality of these MBA courses, which on many occasions fail to deliver what is expected from different management institutions. Though there is a vast difference among different institutes across the countries in terms of infrastructure, culture etc. the dissatisfaction in management education is not border bound and amazingly similar.

*Corresponding Author: Ravi Shankar, Department of Management Studies, Indian Institute of Technology Delhi, Viswakarma Building, Hauz Khas, New Delhi-110 016, India. Tel. +91 11 26596421; E-mail: ravil@dms.iitd.ernet.in, r.s@rediffmail.com

In India, the increasing demands for postgraduate education, specially the management education, has shown a pattern of steep rise. India has close to a 1,000 business schools, out of which around 953 are recognised by All India Council for Technical Education (AICTE). Just 15 business schools are globally benchmarked as per a study (BUSINESS WORLD, 2004). However, there is a serious debate the quality of education. The every-increasing number of institutions offering management course has raised one command question pertaining to quality of education.

Education sector is considered a service sector (Sallis, 1993) and for those willing to manage service quality, it is very important to have some understanding of consumers' expectation and its significance in relation to service quality. "Knowing what consumers expect is the first, and possibly the most critical step in delivering service quality" (Zeithaml et al., 1990, p.51). Customer satisfaction plays an important role and it is the rule for survival in the long run. Therefore, quality in management education is very important from a research perspective.

2. Literature Review

Today, student is seen as an active participant in the process of education rather than as a product or outcome. Sahney et al. (2004) discussed that the quality of education has become important as the product/output of the system have a direct impact on the quality of their employer organizations.

Against this background, the aim of this research is to establish whether the programmes offered by the business schools are relevant to the pupil's expectations? Whether the MBA programmes have met the expectations of the graduates themselves? Institutions can attract best students through identifying and meeting student's needs and expectations. Focussing on student satisfaction enables the institution to adapt to student needs and also to develop a system for continuously monitoring how effectively they meet or exceed student needs.

Two schools of thoughts are currently being used as ways to measure the quality of services including educational processes. SERVQUAL was developed by Parasuraman et al. (1998) while the second one was developed by Zeithaml et al. (1990) and Yanhong et al. (1998) as a performance-based approach. There have been quite a few variants of SERVQUAL model. Numerous researchers (Cronin and Taylor 1992; Sureshchander et al. 2002 etc.) have derived the positive relations of service quality with customer satisfaction, retention and loyalty. Beach and Burns (1995) developed a model based on customers' satisfaction and dissatisfaction and discussed about a gap analysis which is viewed as a function of the difference between what the worker expects from a job and what he/she experiences.

Genichi Taguchi proposed 'Robust Parameter Design' which generated a great amount of interest among practitioners and academicians. His techniques are simpler and much more effective. This is the reason why his methods are popular and widely used (Taguchi and Wu 1980; Box 1996; Montgomery 1992; Nair 1992; Tsui 1996; Wu and Hamada 2000). Taguchi has developed over 70 distinct S/N ratios. There are four S/N ratios, which are used in most of the times (Equations 1,2,3,4).

$$S/N \text{ smaller the better} = -10 \log [S^2 + y^2] \quad \dots(1)$$

$$S/N \text{ larger the better} = -10 \log [1/n \bar{a} + 1/y_i^2] \quad \dots(2)$$

$$S/N \text{ nominal the best} = -10 \log S^2/y^2 \quad \dots(3)$$

Where S^2 is the sample variance and y is the mean.

$$S/N \text{ operating window type} = -10 \log [\bar{a} / y_i^{2/n}] - 10 \log [1/y_i^2] \quad \dots(4)$$

3. Area of Research

This paper attempts to measure the student's overall satisfaction for the management schools from student's point of view. This paper discusses the serious issues existing in the present management institutions and also attempts to give a measure to handle these challenges effectively.

As Lewis and Booms (1983) defines "Service Quality is a measure of how well the service level

delivered matches customer expectations. Delivering quality service means conforming to customer expectations on a consistent basis." Beach and Burns (1995) developed a model based on customers' satisfaction and dissatisfaction, which was different from the model given by Parasuraman et al. (1985). Beach and Burns (1995) discusses about a gap analysis which is viewed as a function of the difference between what the workers expects from a job and what he/she experiences. Similar approach has also been adopted in this research.

4. Experimental Design

After having a brainstorming session with the students, the following steps were considered essential in order to build a model to measure the overall satisfaction of the management students. The steps are as follows:

- 1) define the problem and quantify the objective of the research,
- 2) conduct a brainstorming session of prepare the list of important issues and their respective levels,
- 3) select an appropriate O.A., which can accommodate all the important variables and can estimate their impact on the satisfaction level of the students,
- 4) prepare a questionnaire for collection of the data on the observation and expectation of the students from a management programme,
- 5) conducting Taguchi related analysis including ANOVA,
- 6) identify the significant factors with their significance level,
- 7) finding the optimum level of the important factors involved in the satisfaction of the students.

The questionnaire was prepared in two parts- (i) observation part, and (ii) expectation part. This approach is very similar to approach suggested by Beach and Burns (1995). The authors discussed about services offered by the organization (now) and how it (ought) to address them. As respondents opted for their suitable options and filled the questionnaire, satisfaction was measured by comparing the evaluation of expectation (ought) and experience (now).

In canvassing the observations and expectations of the MBA programme, questionnaires were administered to a total population of 150 MBA graduates randomly. For this three B-schools were chosen randomly in Delhi, India. A total of 73 usable questionnaires were received and adopted in the analysis. Eliminating the incomplete questionnaires a response rate of 48% was achieved. No follow up was done as the number of responses (n=73) was considered satisfactory and also the representative of the population strata.

Identification of factors from customer's point of view: After receiving the filled in questionnaire, the gathered information is analysed through Ishikawa or cause-effect (fish-bone) diagram (Figure 1). In the cause-effect diagram shown below, all the causes are analysed by comparing the expectations and observations for the effect of dissatisfaction of the customers. Beach and Burns (1995) discussed this method of measuring the customer's satisfaction. The factors/causes are selected where the observation is less than expectation which means the patients are dissatisfied with the services provided by the educational institutions. All the factors emerged as important factor and are given in Table 1 with their respective levels and the factors are assigned alphabet identifiers viz. A, B, C, D, etc. for further discussions.

Table 1 : List of factors with their corresponding levels affecting the services provided by Institutions

Identifier for the factors	Factors	Level 1	Level 2	Level 3
A	Do you expect that social status will go up?	Strongly Agree	Agree	Strongly Disagree
B	Do you expect that MBA degree will enhance your qualification?	Strongly Agree	Agree	Strongly Disagree
C	Do you expect that it will give you a very good job?	Strongly Agree	Agree	Strongly Disagree
D	Do you expect that your present working status would improve?	Strongly Agree	Agree	Strongly Disagree
E	Do you expect that this agree would enhance the knowledge?	Strongly Agree	Agree	Strongly Disagree
F	Do you expect that it would upgrade your skill?	Strongly Agree	Agree	Strongly Disagree
G	Do you expect that it would help you in your future growth (long term) in job?	Strongly Agree	Agree	Strongly Disagree
H	Do you expect that it would give you financial stability?	Strongly Agree	Agree	Strongly Disagree
I	Do you expect that quality of life would be better?	Strongly Agree	Agree	Strongly Disagree
J	Do you expect that this would help you in doing academic research (Ph.D.) in management?	Strongly Agree	Agree	Strongly Disagree
K	Do you expect that it would help you in changing the profession?	Strongly Agree	Agree	Strongly Disagree
M	Do you think that there are no opportunities without an MBA degree?	Strongly Agree	Agree	Strongly Disagree
N	Do you think that this is a challenging course?	Strongly Agree	Agree	Strongly Disagree
O	Do you expect that this course would make you sellable in the market?	Strongly Agree	Agree	Strongly Disagree
P	Do you expect to come out from your personal family problems after taking this course e.g. marriage etc.	Strongly Agree	Agree	Strongly Disagree
Q	Do you expect that this course would enhance your personality?	Strongly Agree	Agree	Strongly Disagree
R	Do you expect that this course would help you in network building with peer group, Faculty etc.	Strongly Agree	Agree	Strongly Disagree

S	Do you expect that you would be following the herd after joining this course?	Strongly Agree	Agree	Strongly Disagree
T	Do you expect that it would link the theoretical and practical world?	Strongly Agree	Agree	Strongly Disagree
U	Do you expect that your analytical skill would improve after completing this course?	Strongly Agree	Agree	Strongly Disagree
V	Do you expect that this course would give you enough business knowledge or entrepreneurial knowledge?	Strongly Agree	Agree	Strongly Disagree
W	Do you expect your decision-making ability would be improved?	Strongly Agree	Agree	Strongly Disagree
X	Do you expect that your team building skill would be upgraded?	Strongly Agree	Agree	Strongly Disagree
Y	Do you expect to have a secured and successful career after completionn of this course?	Strongly Agree	Agree	Strongly Disagree
Z	Do you expect to have an upper edge in future?	Strongly Agree	Agree	Strongly Disagree

Student's satisfaction in management school

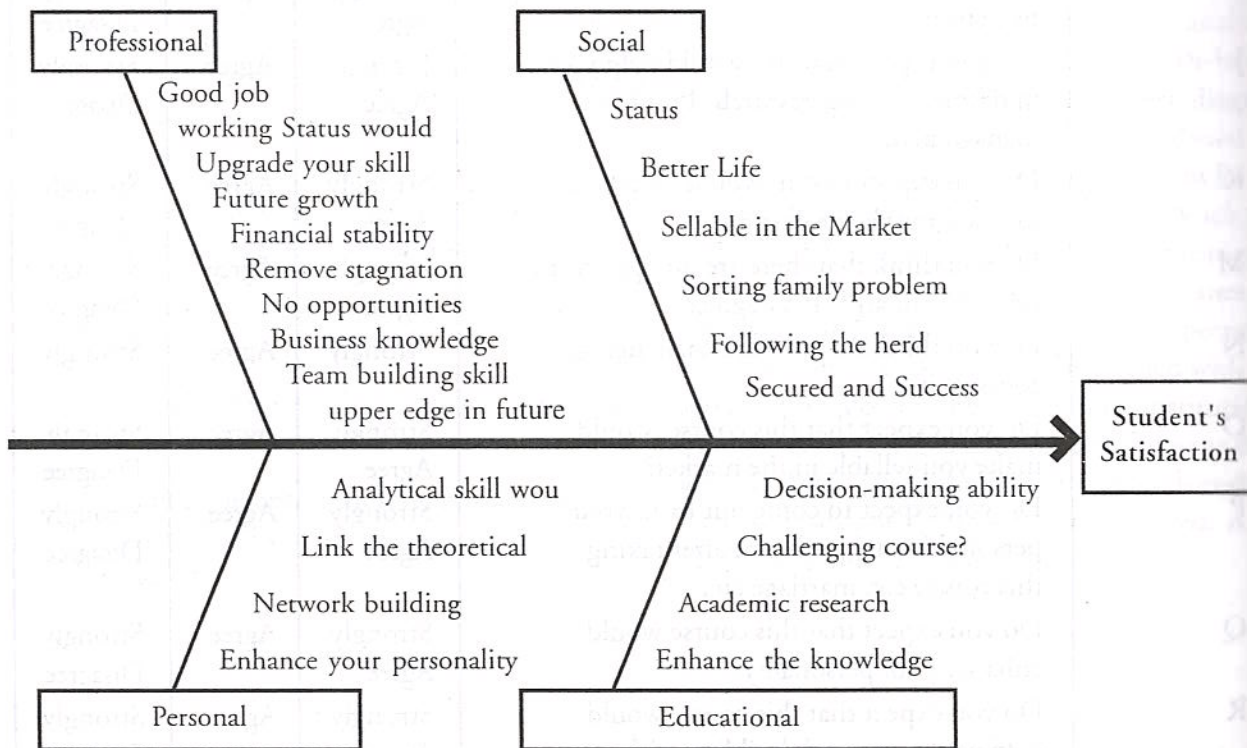


Figure 1: Ishikawa Diagram

Selection of the Orthogonal Array: In order to choose an appropriate orthogonal array, degrees of freedom are calculated. Since there are 26 factors and out of these, twenty five are at 3 levels and one factor is at 2 levels, the total degrees of freedom require is $25(3-1) + 1(2-1) = 51$ d.f. In this case a mixed level design in required, L54 O.A. is chosen.

Based on the experimental design for an L_{54} orthogonal array the factor X is at two levels due to which is it assigned to column 1 and the other factor

are assigned to column 2 to 25 arbitrarily. Factor A is assigned to column 2 at 3 levels, factor B is assigned to column 3 at 3 levels and so on.

Conducting Requirements: For each run the response is calculated. Since we have chosen L_{54} O.A., there are 54 runs and the experiment is done without replication. As our quality characteristic is larger the better, Signal to noise ratio is calculated as $S/N_{(LFB)} = -10 \log_{10} (1/n \sum S_i^2/y_i^2)$. Results are shown in Table 2.

Table 2. Response under various Trials/Runs

Factor Identifier

X	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	Y	Z	Response	S/N
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	351	50.9061
1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	507	54.1002
1	1	1	1	1	1	1	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	357	51.0534
1	1	2	2	2	2	2	2	1	1	1	1	1	1	2	3	2	3	2	3	2	3	2	3	2	3	432	52.7097
1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	1	3	1	3	1	3	1	3	1	3	463	53.3116
1	1	2	2	2	2	2	2	3	3	3	3	3	3	1	2	1	2	1	2	1	2	1	2	1	2	418	52.4235
1	1	3	3	3	3	3	3	1	1	1	1	1	1	3	2	3	2	3	2	3	2	3	2	3	2	408	52.2132
1	1	3	3	3	3	3	3	2	2	2	2	2	2	1	3	1	3	1	3	1	3	1	3	1	3	340	50.6296
1	1	3	3	3	3	3	3	3	3	3	3	3	3	2	1	2	1	2	1	2	1	2	1	2	1	359	51.1019
1	2	1	1	2	2	3	3	1	1	2	2	3	3	1	1	1	1	2	3	2	3	2	3	2	3	370	51.364
1	2	1	1	2	2	3	3	2	2	3	3	1	1	2	2	2	3	1	3	1	3	1	3	1	3	355	51.0046
1	2	1	1	2	2	3	3	3	3	1	1	2	2	3	3	3	3	1	2	1	2	2	1	2	1	386	51.7317
1	2	2	2	3	3	1	1	1	1	2	2	3	3	2	3	2	3	3	2	3	2	3	2	1	1	387	51.7542
1	2	2	2	3	3	1	1	2	2	3	3	1	1	3	1	3	1	3	1	3	1	3	2	2	2	386	51.7317
1	2	2	2	3	3	1	1	3	3	1	1	2	2	1	2	1	2	2	1	2	1	3	3	3	3	385	51.7092
1	2	3	3	1	1	2	2	1	1	2	2	3	3	3	2	3	2	1	1	1	1	2	3	2	3	314	49.9386
1	2	3	3	1	1	2	2	2	2	3	3	1	1	1	3	1	3	2	2	2	2	3	1	3	1	387	51.7542
1	2	3	3	1	1	2	2	3	3	1	1	2	2	2	1	2	1	3	3	3	3	3	1	2	1	403	52.1061
1	3	1	2	1	3	2	3	1	2	1	3	2	3	1	1	2	3	1	1	3	2	2	3	3	2	370	51.3640
1	3	1	2	1	3	2	3	2	3	2	1	3	1	2	2	3	1	2	2	1	3	3	1	1	3	373	51.4342
1	3	1	2	1	3	2	3	2	3	1	3	2	1	2	3	3	1	2	3	2	1	3	3	1	1	328	50.3175
1	3	2	3	2	1	3	1	1	2	1	3	2	3	2	3	3	2	2	3	1	1	3	2	1	1	361	51.1501
1	3	2	3	2	1	3	1	2	3	2	1	3	1	3	1	1	3	3	1	2	2	1	3	2	2	387	51.7542
1	3	2	3	2	1	3	1	3	1	3	2	1	2	1	2	2	1	1	2	3	3	2	1	3	3	332	50.4228
1	3	3	2	3	2	1	2	1	2	1	3	2	3	3	2	1	1	3	2	2	3	2	1	1	2	379	51.5728
1	3	3	2	3	2	1	2	2	3	2	1	3	1	1	3	2	2	1	3	3	1	2	2	3	1	392	51.8657
1	3	3	2	3	2	1	2	3	1	3	2	1	2	2	1	3	3	2	1	1	2	3	3	1	2	381	51.6185
2	1	1	3	3	2	2	1	1	3	3	2	2	1	1	1	3	2	2	2	3	2	2	3	1	2	374	51.4574
2	1	1	3	3	2	2	1	2	1	1	3	3	2	2	2	1	3	1	3	3	1	3	1	3	1	404	52.1276
2	1	1	3	3	2	2	1	3	2	2	1	3	3	2	1	2	1	2	1	1	2	1	2	3	3	401	52.1276
2	1	2	1	1	3	3	2	1	3	3	2	1	2	3	1	1	1	3	2	3	2	3	2	2	3	468	51.317
2	1	2	1	1	3	3	2	2	1	1	3	3	2	3	1	2	2	2	2	1	3	1	3	3	1	468	52.1061
2	1	2	1	1	3	3	2	3	2	2	1	3	1	2	3	3	3	3	2	1	2	1	2	1	2	482	52.0845
2	1	3	2	2	1	1	3	1	3	3	2	2	1	3	2	2	3	1	1	1	1	1	3	2	3	398	51.9977
2	1	3	2	2	1	1	3	2	1	1	3	3	2	1	3	3	1	3	1	2	2	2	2	1	3	411	52.2768
2	1	3	2	2	1	1	3	3	2	2	1	1	3	2	1	1	2	1	2	3	3	3	3	2	1	445	52.9672
2	2	1	2	3	1	3	2	1	2	3	1	3	2	1	2	3	3	2	1	1	3	2	1	3	2	371	51.3875
2	2	1	2	3	1	3	2	2	3	1	2	1	3	2	2	3	1	1	3	2	2	1	3	3	1	371	51.3875
2	2	1	2	3	1	3	2	3	1	2	3	2	1	3	3	1	2	2	1	3	3	2	1	1	2	369	51.3405
2	2	2	3	1	2	1	3	1	2	3	1	3	2	3	3	2	1	1	2	1	3	1	1	3	2	413	52.3190
2	2	2	3	1	2	1	3	2	3	1	2	1	3	3	1	1	3	2	2	3	1	2	2	1	3	399	52.0195
2	2	2	3	1	2	1	3	3	1	2	3	2	1	1	2	2	1	3	3	1	2	3	3	2	1	385	51.7092
2	2	3	1	2	3	2	1	1	2	3	1	3	2	3	2	1	1	2	3	3	2	2	3	1	1	371	51.3875
2	2	3	1	2	3	2	1	2	3	1	2	3	1	3	2	3	1	3	1	1	3	3	1	2	2	365	51.2459
2	2	3	1	2	3	2	1	3	1	2	3	2	1	2	1	3	3	1	2	2	1	1	2	3	3	371	51.3875
2	3	1	3	2	3	1	2	1	3	2	3	1	2	1	1	3	2	2	3	3	2	1	1	2	3	378	51.5498
2	3	1	3	2	3	1	2	2	1	3	1	2	3	2	1	3	3	1	1	3	2	2	3	2	3	415	52.3610
2	3	1	3	2	3	1	2	3	2	1	2	3	1	3	3	2	1	1	2	2	1	3	3	1	2	395	51.9319
2	3	2	1	3	1	2	3	1	3	2	3	1	2	2	3	1	1	3	2	1	1	2	3	3	2	367	51.2933
2	3	2	1	3	1	2	3	2	1	3	1	2	3	3	1	2	2	1	3	2	2	3	1	1	3	315	49.9662
2	3	2	1	3	1	2	3	2	1	2	3	1	1	2	3	3	2	1	3	3	1	2	2	1	2	342	50.6805
2	3	3	2	1	2	3	1	1	3	2	3	1	2	3	2	2	3	1	1	2	3	3	2	1	1	362	51.1742
2	3	3	2	1	2	3	1	2	1	3	1	2	3	1	3	3	1	2	2	3	1	1	3	2	2	391	51.8435
2	3	3	2	1	2	3	1	3	2	1	2	3	1	2	1	1	2	3	3	1	2	2	1	3	3	363	51.1981

X	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	Y	Z	Resp	S/N
2	3	3	2	1	2	3	1	2	1	3	1	2	3	1	3	3	1	2	2	3	1	1	3	2	2	391	51.8435
2	3	3	2	1	2	3	1	3	2	1	2	3	1	2	1	1	2	3	3	1	2	2	1	3	3	363	51.1981

Computer-generated output of the main-effects plot for the signal to noise ratio is given in Figure 2. Different factors have different values at various levels. Since our quality characteristic is 'higher the better'. The optimum level can be decided of the various factors. The first factor is X and it has attained its maximum value at level 2. Referring to Table 1, factor X is the expectation about the team skill development and the optimum level is 2 that is 'Agree'. Since it is a significant

factor, which affects the satisfaction of the management students, must be considered by the institutions providing the education in the same field. A similar interpretation can be done for other factors viz. factor A is at level, factor B is at level 2 and so on. ANOVA is also conducted at 95% level of significance and insignificant factors are pooled. The optimum combination is given in Table 3 at 95% level of significance.

Main Effects Plot for S/N Ratios

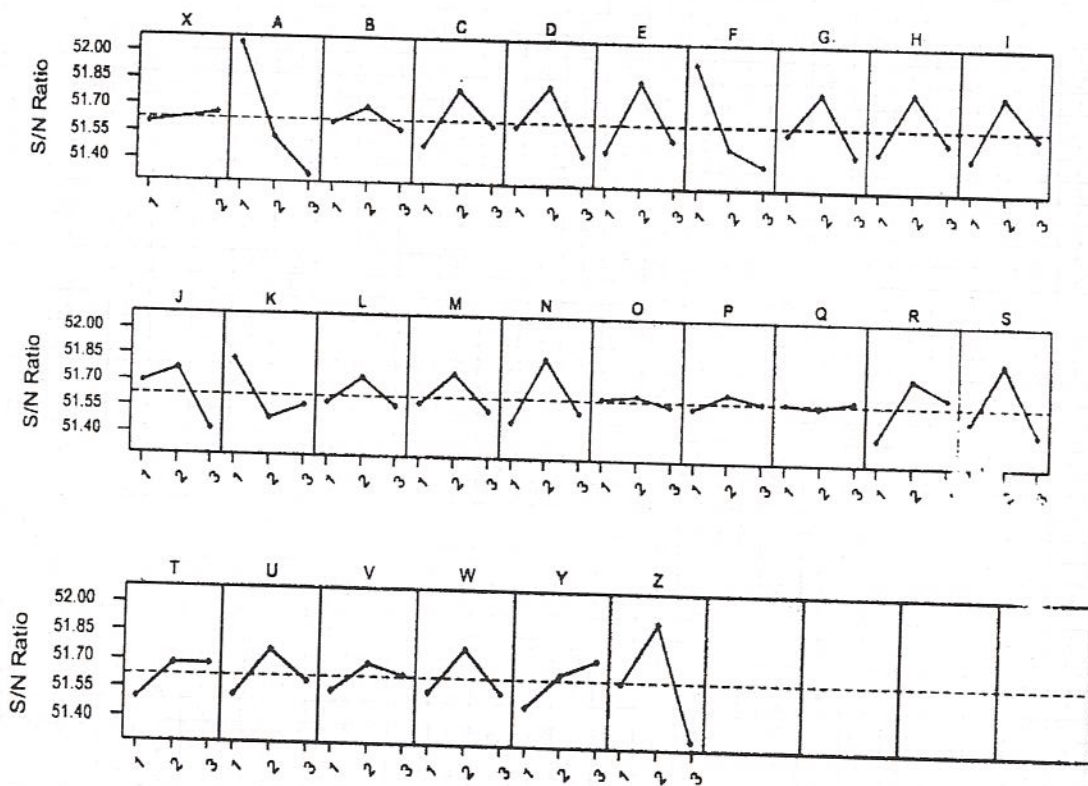


Figure 2. The main effect plot for signal to noise ratio

Table 3. Optimum Condition after pooling the insignificant factors

Factors	A	C	D	E	F	G	H	I	J	K	M	N	R	S	T	U	W	Y	Z
Level	1	2	2	2	1	2	2	2	2	1	2	2	2	2	2	2	2	3	1

5. Managerial implications and Insights

The paper focuses on the right way to reduce the gap between the expectation and experiences/ observations of the students in management education. This is accomplished by developing a model using Taguchi's robust design technique. The analysis is based on maximizing the expectation of the student's so that the institutes are able to satisfy or exceed their needs. The important factors emerging from this study are:

1. Students feel very strongly that after doing the management course their social status goes up. The course is also helpful in upgrading their skills and it also helps them in changing their profession in future. These could be important factors for the management institutions and they can make the programme more useful by making it more multi-skill oriented. This would help the institutions to attract the good students from the society and it would also help them to improve their quality of the programme. Since customer satisfaction is the most important factor in service sector, considering these issues will give an advantage in future growth of the management institutions.
2. Students also feel that this course is going to help them to enhance their qualification and knowledge. This could be an important input for the management institutes. If students expects this programme to be academic oriented, then the institutes can look into the course curricula to develop the same.
3. Students also agree that apart from the academic knowledge, this programme also provide business/entrepreneurial knowledge. This could be an important factor as it helps in removing the stagnation for the job helps them to grow in future, gives them a financial stability and they become more sellable in the market. For any management institute, these are important pieces of information. They can emphasize on entrepreneurship and encourage the students

to go for a better future. This system should be made in such a way so that future managers who are willing to grow can learn the changing needs of the industries. This means that the management education provided by the institutions should be very close to the needs of economic and social development.

4. Students strongly disagree on some of the issues that this course helps to link the practical and real life world. The real world is more complex, uncertain and an MBA course is not sufficient to learn all the complexities.

It would be useful to remember that the management educational system exists for satisfying the industrial needs. Management institutions should maintain a frequent contact with industries and various other organizations in order to realize their needs. The programs should be designed to create industrial linkages to enhance managerial knowledge and skills. It is absolutely essential to balance theory and application.

5. Decision-making and problem solving are managers' core activities. As there is a general agreement that this course helps to develop the decision-making skill and analytical skill, to a great extent this can be achieved too. Students must be prepared and skilled in making decisions under uncertainty, especially when they are leading a group in the search of appropriate solutions. Many students may interpret theory as a difficult approach to reality and a boring way to learn. The teaching method conducted by management institutions must include the application of newly gained knowledge to the analysis of real situations. This could be an effective source to maximize the satisfaction of the management students.

6. Conclusion

This paper intends to provide some insights into management education processes and the expectations of the students. Management institutes

should commit to a new vision of higher education in the field of management skills. This new vision would permit to improve the quality of management education processes for graduating better managers in order to increase the performance level of industries.

Acknowledgment

The authors acknowledge the help of Prof. Ranjit K. Roy, Nutek Inc. USA for providing us the valuable inputs and QUALITEK-4, which has been used in this research paper.

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