

Identifying Character Attributes of Total Quality People

[Kano methodology experimented to categorize quality attributes of a person]

Abstract

*Quality people do not emerge by chance, but is a result of constant grooming throughout different phases of their life. Since the educational institutions bear the responsibility of developing the right characters of the person as a student to produce Total Quality People (TQP), they must be able to identify the character attributes that the society demands or requires. An experiment is conducted with **Kano methods** for the first time to categorize the quality attributes required to be a total quality people. This method is being applied widely to categorize the quality attributes of products and services since long. Twenty character quality attributes of a person are chosen for the experiment and feeling survey of stakeholders of educational institutes is conducted with instruments based on Kano methods. It is found that eight attributes such as Communication skills, Creativity, Risk taking capability, Sense of humor, Adaptability, Sportsmanship, Forward looking and Physical stamina can be confidentially categorized as 'Attractive or exciting quality' where as four attributes as Honesty, Commitments, Human relations and Positive outlooks can be categorized as 'One-dimensional quality' or 'More-is-better quality'. Other six attributes like Knowledge, Self-confidence, Skills, Continuous learning, Desire to excel and tolerance are kept in mixed category which indicated that different types of stakeholders opined them differently. However, two attributes namely Team work and Religious are found to be 'Reversal' and 'Indifference' categories. The experiment which categorizes and prioritizes the character attributes benefits educational institutes for adopting appropriate strategies to plan and design the subject courses and teaching methodologies to produce TQP*

1. INTRODUCTION

The quality product is not a matter of chance but needs careful designing, processing and servicing. Similarly, the quality people are also not a matter of chance, but it needs a constant effort to groom them. In general, a person gets chance to interact with three completely different environments to groom himself¹. At his early and tender age, he interacts with his mother, father and other family members. Some scripts will be written in his tender mind which formulates his attitude and behaviour. Some character will be developed. Then he enters school and college life where he interacts with his teachers and friends, gathers theoretical knowledge of few subjects. More and sometimes even conflicting scripts are added at this phase. After graduation, he enters the working environment where he has to interact with his working colleagues as well as external environment. Here also, he receives some scripts and forms a strong character after compounding them with previous scripts he had received at earlier stages. Thus, characters are build-up inside a person at different stages, interacting with the environment differently. However, a long duration of stay in learning age at the schools and colleges, which counts to about 10 to 25 years of life will definitely plays a big role in molding his character.

As Swami Vivekananda has once said that the educational institutes are character building organizations. The schools must try to add the value of a right kind of character on their students for becoming a total quality people. Total quality people (TQP) are those with commitments, positive outlook, leadership abilities and desire to excel². But there are many other characters which a person should build up, and the educational institutes have a

problem of identifying all these characters and design the required processes as an inbuilt system inside it.

An institution has to perform two activities from time to time - one is, to identify the moving (dynamic) and unvoiced (invisible) needs of the customers, and the second one is, to deploy the identified quality functions in the work or educational process from time to time. The educational institutes which bears the responsibility of developing a right character of a person, or producing a total quality people have to identify the character attributes which the society demands or is in need of.

Prof. Noriaki Kano³ has suggested a methodology which helps to identify different categories of quality attributes like the invisible needs in the form of attractive or exciting quality, more is better or one-dimensional quality, and must-be or necessary quality. The methodology, till now, has been applied in identifying the quality attributes of products and the services but not the people.

Here, an experiment is done with Kano methodology aiming at three objectives- (1) to categorize quality attributes of TQP, (2) to identify the gap in understanding quality attributes by different stakeholders of an educational institute, and (3) to determine positioning of different quality attributes for prioritizing the educational design process.

2. EDUCATIONAL INSTITUTE AS A CHARACTER BUILDING INDUSTRY

A schematic model of an educational institute using system approach is shown in figure 1. Students with aspiration of developing themselves as total quality people are supplied from within the population to the educational institute. Values are added to these students in processes (1,2,3,..N) stages in semester or yearly basis, upgrading from lower stage to higher stages. After building up character, and evaluating and inspecting the quality of students they are awarded the graduation certificate. Then, they become ready to come out from the educational institute. The absorbing population uses these graduates. The question here is who defines the quality of these students?

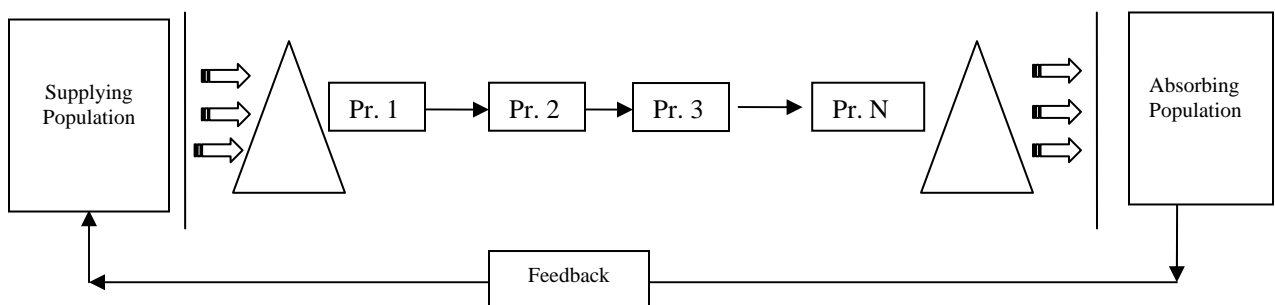


Figure 1: Schematic Model of Educational Institute

There are mainly three different stakeholders in the system. All these three stakeholders of education decide the quality attributes, but may be in different ways.

Supplying population who decide the quality of education at the institute and they pay the expenses of education for the students. They advocate for good education. They are guardians, policy advocates, sponsors and leaders of the society. They are kept at the input side of the system.

Absorbing population who use the graduates of the educational institutes and so they are the real customers. They demand the quality as per their need. They are industries, business houses, higher educational institutes and society at large. They are kept at the output side of the system.

Processors who decide the quality attributes that a student will be value added with. They are educational institute. They admit students, process them, evaluate and give award of graduation.

This study has considered student as a product, and wanted to categorize its quality attributes as Kano has suggested for products and services.

3. KANO METHODOLOGY

Kano methodology⁴ advocated by Prof. Noriaki Kano is one of the popular methods to categorize the quality needs of the customers. The theory states that blindly fulfilling customer requirements has to bear risks associated with it, if the product/service provider is not fully aware of different types or categories of quality that customers demand. He explained two dimensional model of quality in which he has categorized three types of quality as perceived by customer. The two dimensional model is shown in figure 2.

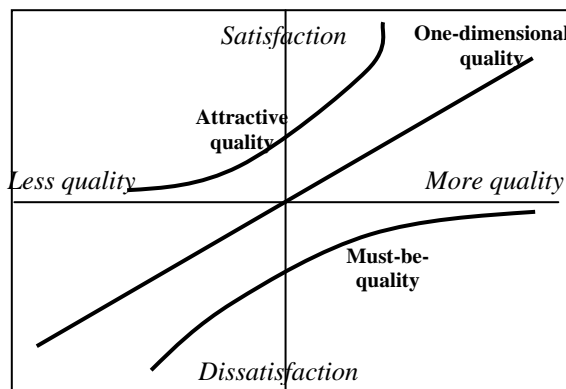


Figure 2: Kano 2-dimensional

One-dimensional quality (O) category contains those attributes which when increased customers will be more and more satisfied. The relationship between the quality level and satisfaction level shows linear relationship. This category can also be called the More-the-better quality.

Must-be-quality (M) category contains those attributes which must be present in the products or services otherwise customers starts complaining. After some limit, even if we increase the quality level of the attributes customers will not express their satisfaction as in one-dimensional category. This category is also called the Necessary quality.

Attractive Quality (A) category contains those attributes which when increased, customers will be excited. These attributes are generally hidden and so called the latent need of customers. If these attributes are not served by the providers customer does not complain but when served with these attributes to customers they excite, and this is useful to create “WOW” effect. This is also called the Exciting quality.

Beside, there is one more category which is called **Indifference quality (I)** which includes those attributes which if included in the product or service customer does not care. This means the absence or presence of the attribute in the product/service is immaterial to the customers.

Kano developed a method called Kano methodology to identify and cluster quality attributes in the above mentioned categories through customer survey, and suggested to design the process as per the customer need and industry capability. These categories are placed in

hierarchical order. The order of quality category follows in the order of importance as **M > O > A > I**.

The successful industries around the world are using this method to identify and categorize the quality attributes of their products, and subsequently introducing attractive quality attributes, improving one-dimensional attributes and not sacrificing must-be-quality attributes. Improvements on the methodology have been done by various researchers⁵. One NASA's study team with Mark Lee and John Newcomb has used this method in managing its science research program which was published in 1996 and 1997⁶. Analyzing quality categories by calculating *Total Strengths* and *Category Strengths* are very much noteworthy and have been adopted in this study, too. In addition to this, a method of prioritizing quality attributes by computing *Better Indices* and *Worse Indices* adopted by Mike Timko of Analogue Devices⁷ is also an improvement in Kano methodology. This is also adopted in this study.

Improvements in the methodology are still going on. People are still questioning on the selection of category through mode as suggested by Kano. Many researchers have incorporated other tools together with Kano's survey tools to be confident in their findings⁸. These methods are widely used in prioritizing quality attributes of products and services. However, it is not yet experimented on categorizing quality attributes of a person. This study can be considered as the first time experiment on categorizing and prioritizing the quality attributes of a person with Kano methodology.

4. RESEARCH DESIGN, SURVEY AND ANALYSIS

20 quality attributes of a student who has been awarded pass certificate (or, a graduate) as indicators of characters of a person were considered for this survey. The quality attributes are knowledge, skills, commitments, sportsmanship, communication skills, human relations, positive outlooks, desire to excel, creativity, far sightedness, continuous learning, religious, team work, self-confidence, honesty, humorous, tolerant, risk taking capability, adaptability and physical stamina⁹. The products taken for the study were graduates of engineering college. However, the result may be applicable for students of any stream and all levels.

The respondents were stratified in three groups among stakeholders of educational institutes, like (1) top level managers of industry/business houses, (2) guardians/ society leaders, and (3) senior faculties and policy makers of educational institutes. The study was conducted in Kathmandu (Nepal), so the culture and values of the respondents may have some typical biasness. However, the results may be applicable in other environments, too.

Kano's model questionnaire was used to collect the feelings of respondents. The functional and dysfunctional questions for all 20 quality attributes were asked to rate the feelings of the respondents. 5 rating answers that were included were— I like it, I expect it, I am neutral, I can tolerate it and I dislike it¹⁰.

To collect data the questionnaire was administered personally through visiting respondents as it wanted information from top level decision makers from all groups. The questionnaire were explained clearly to the respondents and left it to them to collect it other day. The survey took one full month of October 2003. 127 respondents (44 from supplying population, 41 from absorbing population and 42 from processors) returned the questionnaire out of 150 (50 each for three groups) questionnaires distributed.

For analyses of the data collected, categorization of different quality attributes were made using Kano's quality evaluation table. After that, the category and total strengths¹¹ were calculated. Then, "better" and "worse" indices¹² were also calculated to grasp further knowledge on the quality attributes of a graduate that the stakeholders or the society has perceived.

Step 1 Quality Evaluation of Attributes

First of all, the responses from the survey were all compiled and tabulated in 5 by 5 matrix for each of the 20 character attribute questions, separately for each of three stratified groups, that is Industry/Business

(IB), Guardian/Society (GS), and Educational Institute (EI). Thus, 60 tables were produced. Then, 20 quality categorization tables were prepared for each attribute by categorizing the responses into Must-be (M), One-dimensional (O), Attractive (A), Indifference (I), Reversal (R) and Questionable (Q) by referring the Categorization Reference table as shown table 1

Step 2: Total Strength and Category Strength of Attributes

As a second step, the total strength (TS) was calculated for all character attributes by computing the percentage of responses in three categories (M, O & A) out of total responses as suggested by Mark lee and John Newcomb. The attributes then were sorted in ascending order of total strength. Category strength (CS) of all attributes was then calculated.

Step 3. Better and Worse Indices of Attributes

As a third step, the proposal made by Mike Timko was used to calculate the better and worse indices of all attributes. "Better" index means- if the quality increased the customers will be more satisfied; where as "Worse" index means- if it is not provided the customers will be more dissatisfied. This helped in prioritizing the attributes. Better indices was calculated with the formula $(M+O)/(M+O+A+I)$ and worse indices was calculated with the formula $(O+A)/(M+O+A+I)$.

<i>RESPONSES</i>		DYS-FUNCTIONAL				
		1. Like	2. Expect	3. Neutral	4. Tolerate	5. Dislike
FUNCTIONAL	1. Like	Q	A	A	A	O
	2. Expect	R	I	I	I	M
	3. Neutral	R	I	I	I	M
	4. tolerate	R	I	I	I	M
	5. Dislike	R	R	R	R	Q

Table 1. Categorization Reference Table

5. RESULTS AND DISCUSSION

The results after analyses depict the following findings regarding quality attributes of a total quality people. The 20 quality attributes were categorized and prioritized as follows.

CHARACTER ATTRIBUTES	M	O	A	I	R	Q
01. Knowledge	44	45	18	19	1	0
02. Skills	23	41	45	17	1	0
03. Commitments	32	69	17	8	1	0
04. Sportsmanship	4	23	71	27	2	0
05. Communication Skills	11	32	68	14	2	0
06. Human Relations	25	48	27	18	8	1
07. Positive Outlooks	20	52	31	19	3	2
08. Desire to Excel	7	16	55	42	5	2
09. Creativity	8	33	66	20	0	0
10. Forward Looking	6	16	71	27	3	4
11. Continuous Learning	14	40	52	18	2	1
12. Religious	3	14	40	65	5	0
13. Team Work	6	13	44	31	21	12
14. Self Confidence	15	46	43	21	0	2
15. Honesty	34	73	11	8	1	0
16. Sense of Humor	6	27	65	23	2	4
17. Tolerance	14	56	40	14	1	2
18. Risk Taking Capability	13	25	61	24	3	1
19. Adaptability	13	16	69	25	3	1
20. Physical Stamina	8	12	64	41	2	0

Table 2. Quality Evaluation table

First of all, a quality evaluation table was prepared with the number of responses in each category of quality (M,O,A,I,R and Q) of 20 character attributes of a person.. The quality evaluation table for total respondents is shown in table 2.

The table depicts that identifying category of quality by mode alone will not be always suitable. In the case of 1st attribute- **Knowledge**, the highest responses suggest to categorize it as one-dimensional (O) with 45 responses, where as the second highest is only one response behind it suggesting must-be quality (M). Where as in some character attributes the mode is quite significant and so can be confidently categorize as one having maximum responses. For example, the 4th attribute- **Sportsmanship** having highest response of 71 can be confidently categorize as attractive (A) which left behind the second highest of 27.

Therefore, before categorizing all character attributes with only modes of responses as suggested by Kano, the method adopted by Mark Lee and Newcomb was used by computing **Total strength [TS]** and **Category strength [CS]** in the second step. The formula for total strength is a percentage of (Responses in M+O+A categories) divided by the total responses, i.e., 127. And, the formula for category strength is a percentage of (highest – second highest response) divided by the total response, i.e. 127.

First, the character attributes were sorted in descending order of total strength. The table depicts that the total strengths of responses varied from 93 percent to 45 percent. Only those attributes which have more than 60 percent strengths were considered for further evaluation.

Two attributes- **Teamwork** and **Religious** have less than 50 percent total strengths that mean half of the responses responded with indifferent, reversal or questionable categories and can not be specified in a particular categories like must-be, one-dimensional and attractive quality.

Regarding other eighteen attributes, category strengths were used to categorize confidently in one of the three Kano's categories (M,O or A). The attributes which has more than 15% CS have only been considered to categorize in one of the types. There were 6 attributes which have less than 15 percent CS. Those attributes were Knowledge (1%), Self confidence (2%), Skills (3%), Continuous learning (9%), Desire to excel (10%) and Tolerance (13%). These are termed as mixed (X) category.

Out of the twelve remained characters, four, i.e. honesty, commitments, human relations and positive outlooks can be confidently categorized as one dimensional quality attributes, or more-is-better quality. The total strength and category strength confirms to it and

there is not much difference in opinion of three stakeholders, too. In other words, these four attributes has to be taken care by the educational institutes to give more quality impetus to students so that the satisfaction level of guardians and industries will increase as the quality of these character can be developed.

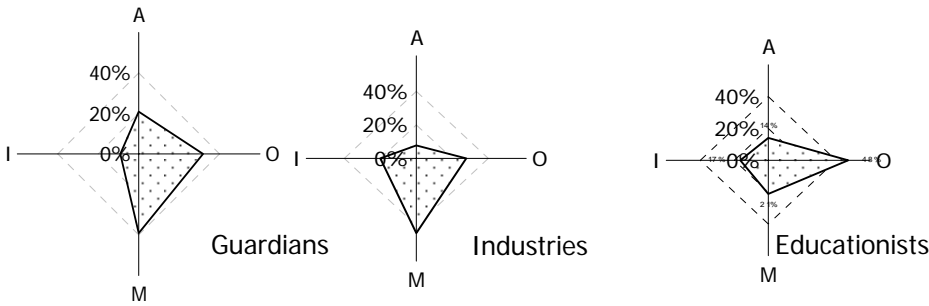
Other eight characters, like communication skills, creativity, risk taking capability, sense of humor, adaptability, sportsmanship, forward looking and physical stamina are categorized as attractive quality by all three stakeholders. That means if some persons do not have these attributes, people may not dislike them, if present they will be more than happy. So these are called attractive or exciting quality attributes.

Furthermore, on revisiting the quality evaluation table of six character attributes- Knowledge, Self confidence, Skills, Continuous learning, Desire to excel and Tolerance which were categorized as mixed category (X), it appeared that there is a difference of responses among three stakeholders. This is an important finding that in these six character attributes, there is a gap in understanding on the quality of a person. This is illustrated graphically below in figure 3, 4, 5, 6, 7 and 8.

CHARACTER ATTRIBUTES	M	O	A	TS	CS	Cat
Honesty	34	73	11	93%	31%	O
Commitments	32	69	17	93%	29%	O
Human Relations	25	48	27	79%	17%	O
Positive Outlooks	20	52	31	81%	25%	O
Communication Skills	11	32	68	87%	28%	A
Creativity	8	33	66	84%	26%	A
Risk Taking Capability	13	25	61	78%	28%	A
Sense of Humor	6	27	65	77%	30%	A
Adaptability	13	16	69	77%	35%	A
Sportsmanship	4	23	71	77%	35%	A
Forward Looking	6	16	71	73%	35%	A
Physical Stamina	8	12	64	66%	18%	A
Knowledge	44	45	18	84%	1%	X
Tolerance	14	56	40	87%	13%	X
Skills	23	41	45	86%	3%	X
Self Confidence	15	46	43	82%	2%	X
Continuous Learning	14	40	52	83%	9%	X
Desire to Excel	7	16	55	61%	10%	X
Teamwork	6	13	44	50%	10%	
Religious	3	14	40	45%	20%	

Table 3. Total and Category Strengths of Response

Figure 3: Knowledge



Educationists opined Knowledge attribute as one-dimensional quality whereas guardians and industries placed it as must-be quality.

Figure 4: Skills

Industries opined skills as attractive quality whereas guardians and educationists placed it as one-dimensional quality.

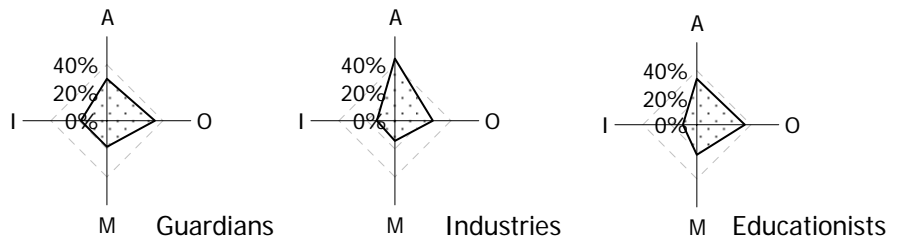
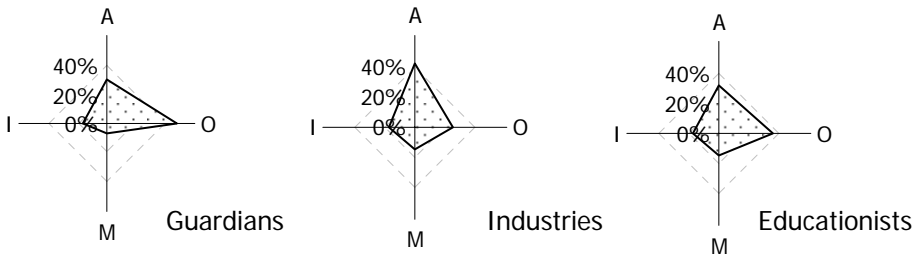


Figure 5: Self Confidence



Industries opined self-confidence as attractive quality whereas guardians and educationists placed it as one-dimensional quality.

Figure 6: Continuous Learning

Industries and educationists clearly opined continuous learning as attractive quality whereas guardians gave mixture responses as attractive as well as one-dimensional quality.

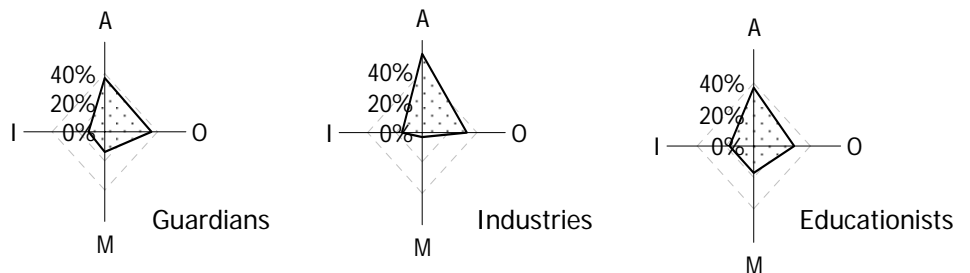
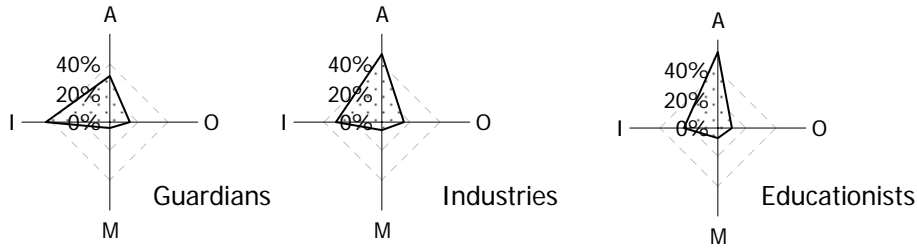


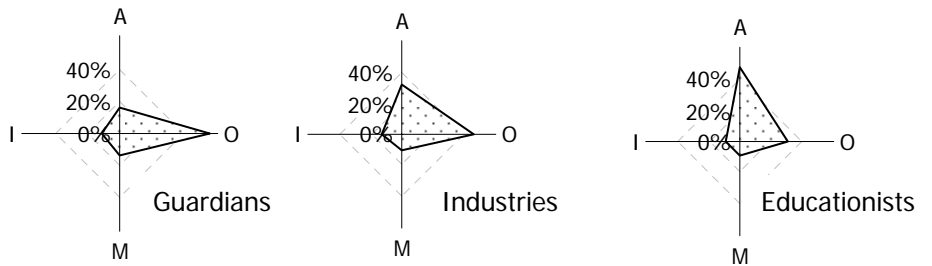
Figure 7: Desire to Excel



Guardians opined desire-to-excel as indifference quality whereas industries and educationists placed it as attractive quality.

Figure 8: Tolerance

Educationists opined tolerance as attractive quality whereas guardians and industries placed it as one-dimensional quality.



Furthermore, revisiting the response information on the two character attributes- religious and teamwork of three stakeholders (educational institutes-EI, industries/business-I/B, and guardians/society-G/S) indicates the following.

<i>Quality Evaluation</i>				
	EI	I/B	G/S	All
A	14	15	11	40
O	5	1	8	14
M	2	0	1	3
I	19	23	23	65
Q	0	0	0	0
R	2	2	1	5
	42	41	44	127

Table 4: Religious

<i>Quality Evaluation</i>				
	EI	I/B	G/S	All
A	10	20	14	44
O	6	2	5	13
M	3	2	1	6
I	13	12	6	31
Q	4	2	6	12
R	6	3	12	21
	42	41	44	127

Table 5: Teamwork

All three stakeholders- EI, I/B and G/S consider that the character attributes of a person being religious is not an important quality attribute for them. Refer table 4. The quality evaluation table of religious attributes showed that the maximum responses lie in indifference categories.

Similarly, when the responses of all three stakeholders on teamwork were reviewed, it is observed that there were lots of “questionable” and “reversal” responses. This means respondents are confused on the question framework. It may be because independent work and teamwork are not exactly the functional and dysfunctional entity. Thus, this attribute could not be properly addressed by the study. Refer table 5.

After categorizing all 20 character attributes in one or more categories of quality, it is now essential to understand which quality attributes have to be taken care of in priority by educational institutes to design the process of educating. Third step analysis of computing the *Better* and *Worse* indices was done for this purpose. The computed figure is given the table 6. After calculating the indices, the character attributes were sorted in descending order as per the values of Worse indices.

CHARACTER ATTRIBUTES	M	O	A	I	POS.	WORSE	BETTER
Honesty	34	73	11	8	II	0.85	0.67
Commitments	32	69	17	8	II	0.80	0.68
Human Relations	25	48	27	18	II	0.62	0.64
Positive Outlooks	20	52	31	19	II	0.59	0.68
Communication Skills	11	32	68	14	III	0.34	0.80
Creativity	8	33	66	20	III	0.32	0.78
Risk Taking	13	25	61	24	III	0.31	0.70
Sense of Humor	6	27	65	23	III	0.27	0.76
Adaptability	13	16	69	25	III	0.24	0.69
Sportsmanship	4	23	71	27	III	0.22	0.75
Forward Looking	6	16	71	27	III	0.18	0.73
Physical Stamina	8	12	64	41	III	0.16	0.61
Knowledge	44	45	18	19	I	0.71	0.50
Tolerance	14	56	40	14	II	0.56	0.77
Skills	23	41	45	17	II	0.51	0.68
Self Confidence	15	46	43	21	III	0.49	0.71
Continuous Learning	14	40	52	18	III	0.44	0.74
Desire to Excel	7	16	55	42	III	0.19	0.59
Team Work	6	13	44	31	III	0.20	0.61
Religious	3	14	40	65	IV	0.14	0.44

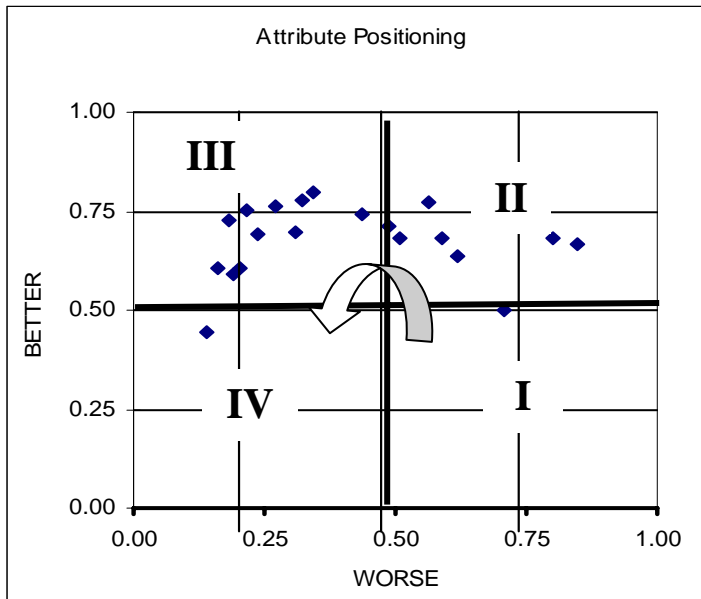
Table 6. The Better and Worse Indices of Character Attributes

The maximum worse index of any attribute indicates that if this attribute is not present in a person then people will start complaining and will not like this person. Hence, the educational institutes must be careful to design the process of educating in this regard. Similarly, the maximum better index of any attribute indicates that if this attribute is present in a person then people will like this person. Hence, educational institutes must adopt to introduce this attribute to make it more competitive and better than other institutes which does not produce the person with this attribute.

The table – 6 depicts that honesty is one of the most important quality of a person, if not present in a person's character then the highest worse index indicates that society will be highly dissatisfied. While designing the process of education, one has to identify the attributes which has highly worse indices as well as high better indices.

The figure 9 shown below is a scatter diagram of better and worse indices of all 20 attributes. This graph may also be called a attribute positioning chart. There are four quadrants in the chart- (Quad. I) High Worse-Low Better (HWLB), (Quad. II) High Worse-

High Better (HWHB), (Quad. III) Low Worse-High Better (LWHB) and (Quad. IV) Low Worse- Low Better (LWLB).



The quadrant I is more important and so the attributes which lies in this quadrant should be prioritized while designing the process to incorporate this attribute in a person. Then, one should go on prioritizing following the anticlockwise direction, that means quadrant II, then III and the least preferred is the quadrant IV. Here, we find that there is only one attribute- knowledge in quadrant I. And, there are seven attributes, honesty, commitments, human relations, positive outlooks, tolerance and skills in quadrant II.

Similarly, twelve attributes lie in quadrant III, like communication skills, creativity, risk taking capability, sense of humor, adaptability, sportsmanship, forward looking, physical stamina, self confidence, continuous learning, desire to excel and team work. And, only one that is religious is positioned in quadrant IV.

6. CONCLUSIONS

The first time experiment of Kano methodology to categorize the quality attributes of a person, considering it as a product of educational institutes revealed that the methodology can be successfully used even to human elements. The educational institute, if conducts such survey from time to time stratifying the samples among three different stakeholders like supplying population, absorbing population and the processors, and design the subject contents and educating methodology after identifying the positioning of individual character attributes and prioritizing them helps the educational institutes to groom total quality people.

The specific findings of this study regarding 20 character attributes selected for the study are:

- a. **Knowledge:** It is the most important attribute among all as it is placed in quadrant I. If compromise is done the customer will dislike the graduates. It is categorized as mix types, as three stakeholders have placed it in three different categories. The external stakeholders as Industry and Guardians have placed it in must be or necessary quality where as educational institute has placed in one-dimensional or more is better quality category.
- b. **Skills and Tolerance:** These attributes appear as next important attributes, as they are placed in quadrant II. If compromise is done the customer may dislike the graduates, but if improved the quality on these attributes then they will be happy. They are categorized as mix types, as three stakeholders have placed them in three different categories. For skills, Industry consider it as attractive or exciting type, where as educational institute

- and guardians placed in one dimensional or more is better type. For tolerance, on the other hand, the external stakeholders Industry and Guardians have placed it in one dimensional quality where as educational institute consider an attractive type.
- c. **Honesty, Commitments, Human relations and Positive outlooks:** These four attributes also lie in quadrant II. Not like above two, all three stake holders have opined that they can be categorized as one dimensional type, which means more is always better.
 - d. **Self Confidence, Continuous Learning and Desire to Excel:** These three attributes lies in quadrant III. However, all three stakeholders categorize them differently so has been placed in mix category. For self confidence and continuous learning, Guardians categorize them in one dimensional where as Industry and Educational institute placed them in attractive quality category. For desire to excel, surprisingly guardians placed in indifference quality attributes where as other two stakeholders categorized it as attractive quality.
 - e. **Communication Skills, Creativity, Risk Taking Capability, Sense of Humor, Adaptability, Sportsmanship, Forward Looking and Physical Stamina:** These seven attributes are placed in quadrant III and all three stakeholders have given the same opinion that these attributes can be placed in attractive or exciting category.
 - f. **Religious:** This attribute is least important attribute among all stakeholders, as it is placed in quadrant IV. All have opined that this attribute is indifference to them.
 - g. **Teamwork:** This attribute could not be analyzed as the framing of the questionnaire was not clear to the respondents. This may be because the teamwork attribute and individual work attribute can not be considered as opposite attributes.

Grooming a total quality people should always be an aim of educational institutes. Hence, continuously conducting survey for categorizing the quality character attributes of a person, the method suggested may be useful.

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- ¹ Here, the term “he” represents both genders-male as well as female
 - ² Mr. Jagdish Gandhi, Founder Manager of CMS School of Lucknow usually uses these phrases and is also published in the International Convention of Students Quality Control brochure. I like to quote this here.
 - ³ Prof. Kano had given a two day seminar on Total Quality Management at Kathmandu in 1999 where he explained about the two dimensional quality model. The author attended this seminar.
 - ⁴ The model underlying Kano’s theory has its roots in social psychology and Motivation-Hygiene (M-H) theory developed in 1959 by Fredrick Herzberg for employees job satisfaction. Kano first presented a paper “On M-H Property of Quality” Nippon QC Gakka, 9th Annual Meeting published Abstracts, 1979 before presenting his revolutionary paper together with some colleagues on “Attractive Quality and Must-be-quality” in Nippon QC Gakka, 12th Annual meeting 1982. The summary of this research was published in 1984.
 - ⁵ Centre for Quality of Management Journal has devoted a special issue on “Kano’s Method for Understanding Customer-defined Quality” in its Volume 2, Number 4, Fall 1993. Different improvements on this method are also included in this issue.
 - ⁶ A paper by Mark Lee and John Newcomb “Applying the Kano Methodology in Managing NASA’s Science Research Program” was published in Centre for Quality of Management Journal, Vol.5 , No.3, Winter 1996. Also NASA’s work presented by Mark Lee and John Newcomb “Applying the Kano Methodology to Meet Customer Requirement: NASA’s Microgravity Science Program” was published in Quality Management Journal, Vol.4, No.3, April 1997 published by American Society for Quality highlights the use of this methodology for research program.
 - ⁷ Mr. Mike Timko is a MIT graduate. He has suggested a method for prioritizing quality attributes after getting the survey information and quality evaluation table of Kano. See CQM Journal, Volume 2, Number 4, Fall 1993.
 - ⁸ “Modeling Importance Preferences in Customer Satisfaction Surveys” by E. Grigoroudis, et al., University of Crete, Greece, 2002 has used multi objective linear programming model with Kano customer survey procedure.
 - ⁹ The quality attributes of a person are identified from literatures on leadership. Considering that we need to develop a future leader in any educational stream whom we can call as a total quality people, these attributes are selected. The traits presented by Andrew J. Du Brin in his book “Leadership-Researches, Findings, Practice, and Skills” published by Houghton Mifflin Company, 1998, together with the attributes generally talk about the total quality people are included in the list.
 - ¹⁰ The questionnaire was pre-tested with five teachers at the university and updated after getting feed back. It was found that it takes about 10 minutes to fill up the questionnaire. It was considered as a feeling survey rather than opinion survey.
 - ¹¹ “Applying the Kano Methodology in Managing NASA’s Science Research Program” Centre for Quality of Management Journal, Vol.5 , No.3, Winter 1996
 - ¹² Mr. Mike Timko’s experiment in continuous analysis of responses on Kano’s quality evaluation table. Refer Part IV (b) of CQM Journal, Volume 2, Number 4, Fall 1993.