

# Participant Satisfaction Analysis Using Kano Model for GWO Training

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**Abstract** – GWO training is an essential requirement for the wind workforce globally to work in the wind turbine industry with common international standard for the safety training and emergency procedures to provide injury free environment. It is estimated that 10% of the global wind workforce is now trained according to the GWO standards and this trend will keep increasing drastically [1]. Hence, it is a necessary for every GWO training providers to provide such trainings by compliance the GWO standards with required facilities to make the participants to attain the training outcomes. In addition to that, the training providers should have good satisfaction level from their participants to attract additional participants. So, this study is made to provide a systematic approach to GWO training providers for determining and prioritizing the training attributes that affects their participants satisfaction. Kano model tool is used to analyze the participants satisfaction. A GWO training provider was chosen at the location of the Tamil Nadu, India. In future, research can be done by optimizing the results of the kano model with QFD to help the training providers to effectively respond to their participants requirements and to shine among their competitors.

**Key Words:** Kano Model, GWO, Stratified random sample selection, training module, BST

## 1. INTRODUCTION

The GWO itself sets a standard requirement for the training providers to conduct GWO training. As the major requirements are the necessary equipment, physical resources, Qualified Instructors and safe training environment for the participants. It is an additional option for the training providers to provide additional facilities to participants. In contrast, the training providers have to provide the training by compliance the GWO standards and maintain a good satisfaction from their participants. Having good participants satisfaction level helps the training provider to sustain between their competitors by attracting large number of participants which increases the brand popularity, stand out from the competition and it's obvious that the satisfied participants will comeback for the refreshers training. About the total number of GWO training in the year 2020, Europe/Middle East/Africa region has registered with 40% of refreshers training and 5% up from 2019 while the Asia/Pacific region has slightly fell from 12% to 10% due to influx of workers new to the wind field [1]. So, there is a big need of understanding the participants defined training attributes for the GWO

training and their needs will be translated to their training procedure/manual to train the qualified wind workforce.

## 2. KANO MODEL

The Kano method is an approach to prioritizing features on a product or service roadmap based on the degree to satisfy customers up to which they are like and even to delight customers [2]. Customer requirements can be understood better and the criteria which have the high influence on customer's satisfaction can be identified and used to focus on. This model helps in trade-off situations where two requirements cannot be met at the same time, the criteria can be identified and give prioritize to them to which have greater influence on customer's satisfaction.

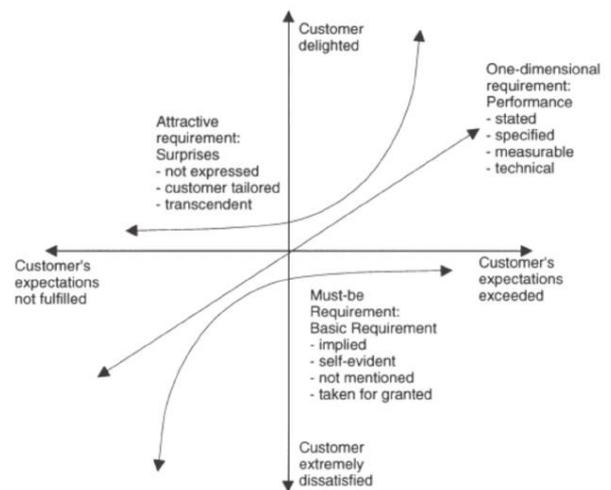


Fig. 1: Kano model (Berger et al., 1993)

N. Kano came up with a diagram to distinguish the customer's requirements and the customer's attributes be categorized into six attributes [3] as below:

- Attractive quality (A): It is a type of attributes that its absence doesn't yield any dissatisfaction.
- Must be quality (M): It is an attribute that cannot increase satisfaction but the absence may dissatisfy.
- One-dimensional quality (O): It is an attribute that offer satisfaction when present and dissatisfaction when absent.
- Indifferent quality (I): This attribute does not result in neither satisfaction or dissatisfaction.
- Reverse quality (R): Customers will be satisfied when the attributes is absent.

- Questionable results (Q): Raise due to misconceptions or making error while answering the questionnaire.

### 3. METHODOLOGY

#### 3.1. Attributes chosen

The GWO training process and procedure were studied with the training manual followed by the training providers and the GWO's standard requirements for the training provider [4]. Based on that, about 25 attributes were chosen for the study and few of these attributes are necessary as per the GWO training standard. These attributes are as follows:

- Pre training webinar sessions (A1)
- Workable walls to deliver training (A2)
- Regional Language for training (A3)
- U-type Seating arrangements (A4)
- Practical session in real work environment (A5)
- Training allocation in working hours (A6)
- Interval time (A7)
- Refreshments (A8)
- Indoor quality (A9)
- Secure cloakrooms (A10)
- Signage to facilitate for way findings (A11)
- Catering facilities (A12)
- Training demonstration kits (A13)
- Notepads and pens (A14)
- Trainer exposure on field (A15)
- Training for the trainer to deliver the content accurately. (A16)
- Assessor for training (A17)
- Adoption of new technologies & developments (A18)
- Individual interaction session (A19)
- Training material distribution (A20)
- Ipsative method of training assessment (A21)
- Gamification features (A22)
- Assessment answer discussion (A23)
- Post training webinar sessions (A24)
- Discount for Refreshers training (A25)

#### 3.2. KANO Questionnaire

The Kano questionnaire for the analysis were framed by having both functional and dysfunctional questions for these training attributes [5]. Each attribute has a functional and dysfunctional question of each had five choice [6] to choose say, 1. I like it that way, 2. It must be that way, 3. I am neutral, 4. I can live with that way and 5. I dislike it. Table 1 shows the model questionnaire which is framed for a training attribute [A1].

**Table -1:** Model Kano Questionnaire

Training attribute [A1] – Pre training webinar sessions	
Question type	Question
Functional	How would you feel if pre-training webinar session is conducted?
Dysfunctional	How would you feel if pre-training webinar session is not conducted?

The participants from the training providers are asked to fill the kano questionnaire during their post training sessions itself in order to avoid the unresponsiveness of the participants [7].

#### 3.3. Sample selection

The selected training provider is accredited to provide GWO trainings like Basic Safety Training (BST) which has four different modules namely Work at height module (WAH), First Aid module (FA), Fire Awareness module (FAW) and Manual Handling module (MH) on both fixed training facility and on-site training facility. In addition to that, the training provider have to provide training with limitation of 12 participants per batch as limited by the GWO committee as trainer to participant ratio [8]. So, the response for kano questionnaires were effectively collected from all the participants by batch-wise since December 2020 and the data is shown in table 2.

**Table -2:** Participants as per Module from DEC20 – MAR21

BST Participants as per module			
Training module	Fixed training (F)	Onsite training (O)	Total
WAH	97	53	$\Sigma$ WAH = 150
FA	35	34	$\Sigma$ FA = 69
FAW	37	33	$\Sigma$ FAW = 70
MH	37	33	$\Sigma$ MH = 70
Total	$\Sigma$ F = 206	$\Sigma$ O = 153	359

As the participants response may vary drastically for the onsite training from one site to another, we considered the response from the participants who undergone training in fixed training facility only. Total number of responses from the participants is 359 which includes the four different training modules. Since, the attributes like A5, A13, A15 and A16 may have different response between the participants of each modules. For ease of result, a stratified random sampling [9] is performed by means of segregating the collected response as per the corresponding module. As the fixed training facility is only considered and the training batches are limited as per the trainer to participant ratio of 12, there is no probability for getting different response between the batches. Hence the response from any one of the 22 batch has homogenous data with respect to the training module.

Since December 2020, 22 BST batches are trained under the fixed facility.

The total response for fixed training facility is 206, it is quite difficult to cover all the response from the participant. For the ease of study, sampling [10] is performed from the total response. As the selected method of sampling is stratified random sampling, we choose the sample from the total population and then proportionate it with respect to each stratum. For sample size, slovin's formula [11] is used as follows

$$n = N / \{1 + N(e^2)\}$$

where n is the sample size, N is the population size and e is level of precision. In this study, 95% confidence level with a population of 206, the sample size is 136. Then using the proportionate stratified random sample, the sample size for each stratum is identified and shown in table 3 by using the formula

$$n_s = (n/N) * N_s$$

where n<sub>s</sub> is the sample size of the stratum, n is the sample size from Slovin's formula, N is population size and N<sub>s</sub> is the population size of the stratum.

**Table -3:** Sample size for each stratum

Proportionate stratified sampling – stratum sample size		
Training Module	Stratum size	Sample size
WAH	97	64
FA	35	24
FAW	37	25
MH	37	25
Total	206	138

The concluded sample size for the stratum is shown in the table 3 and it is achieved by randomly selecting at least two or utmost four participants response from each batch of the WAH module with respect to the batch strength. Since, 22 WAH batches were trained 64 samples have chosen with equal probability of selection. Similarly, the sample for the other three training modules is also selected. Few of our training attributes are oriented with the trainer, so it is necessary to do the study by segregating the strata as per the trainer details. The selected training provider has utilized two of their trainers for all such fixed trainings. Thus, the impact of these two trainers between the batches remains same and no further sample segregation is required.

#### 4. RESULT AND DISUCSSION

For each attribute, based on the participants response of functional and dysfunctional questions, they are categorized with the Kano evaluation table [12] as per the frequency as shown in Fig. 2

CRs		DYSFUNCTIONAL				
		1. like	2. must-be	3. neutral	4. live with	5. dislike
FUNCTIONAL	1. like	Q	A	A	A	O
	2. must-be	R	I	I	I	M
	3. neutral	R	I	I	I	M
	4. live with	R	I	I	I	M
	5. dislike	R	R	R	R	Q
A = Attractive		M = Must-be		R = Reverse		
O = One-dimensional		I = Indifferent		Q = Questionable		

Source: Berger et al. (1993)

**Fig. 2:** Kano evaluation table

The results are evaluated according to the answer frequency. However, if the questions are in-depth or detailed, the results may be distributed. Hence, it is suggested that to choose the maximum value of (O+A+M) or (I+R+Q). In addition, when the results have the same two frequency requirements, the classification that would have the greatest impact should be chosen. The priority order [13] should follow M > O > A > I. Followed by, the customer satisfaction coefficient is calculated by following formula to identify the extent up to which the satisfaction increase or decrease if the requirement is met or not.

$$\text{Satisfaction coefficient (SC)} = (A+O) / (A+O+M+I)$$

$$\text{Dissatisfaction coefficient (DC)} = - (O+M) / (A+O+M+I)$$

The negative sign indicates the dissatisfaction of the participants with respect to the attributes [4]. All such attributes for both questions were analyzed in the way and summarized in to the table 4.

**Table -4:** Results

Attribute	A	O	M	I	R	Q	SC	DC
A1	63	15	17	43	0	0	0.56	-0.23
A2	6	7	28	83	13	1	0.1	-0.28
A3	13	9	4	70	42	0	0.23	-0.13
A4	28	37	52	21	0	0	0.47	-0.64
A5	12	41	65	20	0	0	0.38	-0.76
A6	28	54	42	11	3	0	0.6	-0.71
A7	9	13	15	91	8	2	0.17	-0.21
A8	72	18	21	21	1	5	0.68	-0.29
A9	19	59	42	17	0	1	0.56	-0.73
A10	8	7	15	108	0	0	0.1	-0.15
A11	9	25	81	23	0	0	0.24	-0.76
A12	21	68	39	8	2	0	0.65	-0.78
A13	11	24	18	33	5	47	0.41	-0.49
A14	26	37	62	13	0	0	0.45	-0.71
A15	18	26	75	16	0	3	0.32	-0.74
A16	26	29	18	26	2	37	0.55	-0.47
A17	88	15	11	17	7	0	0.78	-0.19
A18	102	8	24	4	0	0	0.79	-0.23

A19	13	25	67	31	2	0	0.27	-0.67
A20	40	59	35	4	0	0	0.71	-0.68
A21	16	14	14	19	6	69	0.47	-0.44
A22	25	23	23	26	36	5	0.49	-0.47
A23	14	3	27	86	8	0	0.13	-0.23
A24	88	19	11	20	0	0	0.77	-0.21
A25	97	23	7	11	0	0	0.87	-0.22

Among these 25 training attributes, attributes like attractive, must be, one dimensional and indifferent are taken into the consideration

Must be attributes: A4, A5, A11, A14, A15, A19

Attractive attributes: A1, A8, A17, A18, A24, A25

One Dimensional attributes: A6, A9, A12, A20

Indifferent attributes: A2, A3, A7, A10, A23

The determined attributes have six must be attributes, six attractive attributes, four one dimensional attributes and five indifferent attributes. As the must be attributes and attractive attributes shares equal number of occurrences. The priority can be providing to must be attributes over the attractive attributes. This is because the must be attributes deals participant dissatisfaction if absent while the attractive attributes doesn't deal with the dissatisfaction of the participants.

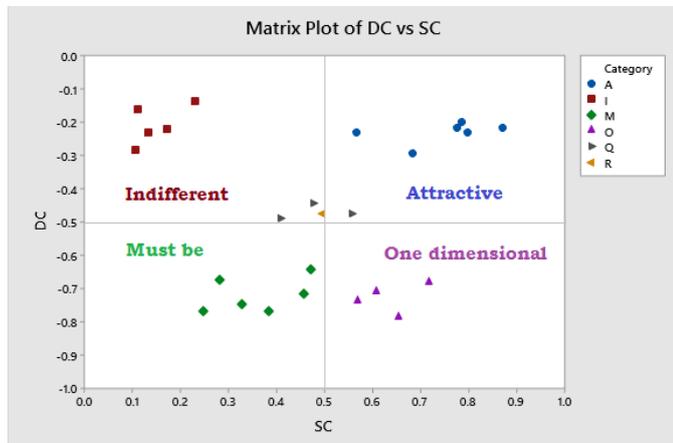


Chart -1: Matrix Plot of SC vs DC

Minitab software is used to draw a plot between satisfaction coefficient and dissatisfaction coefficient in the form of matrix plot by grouping the attributes as category and is shown in chart 1. The satisfaction coefficient ranges from zero to one in x-axis and the dissatisfaction coefficient on y-axis with same range. In this kind, the identified attributes can be visually presented and useful to select the attributes in sequence order. From the plot, we can determine that the must be and one-dimensional attributes are more concentrated about their spread while the attractive and indifferent attributes are spread vastly. Along with that, the priority order for the attributes  $M > O > A > I$  are also considered to determine and prioritize the attributes on which the training provider has to equip themselves to meet their participants requirements as well as to increase the return rate of the participants in the

refreshers training. It is also evidenced that the questionable result of three happenings have occurred around the value of the 0.5 in satisfaction coefficient and dissatisfaction coefficient. Hence, the study can also be done by explicating the corresponding questionnaire for which the questionable result occurred.

### 5. RECOMMENDATIONS

Based on the visual data from the plot and the priority order for the attributes, it is suggested for the training provider to look in to participants requirements in the order of  $M > O > A > I$ . So, the major importance should be given to the attributes like U-type seating arrangements, practical sessions in real work environment, signage facilities to way findings, provide note pads and pens, trainer exposure on field and individual interaction session which are fall under the must be category and they have good chance to increase the participants satisfaction. The next priority should be given to one dimensional requirement which are training allocation in working hours, indoor quality, catering facilities and training material distributions. Both these requirements can be achieved by restructure their training procedure to optimizing the training by allocating the batches with desired seating arrangements in working hours; providing the signage facilities, ambient indoor quality, notepads & pens and catering facility; providing practical sessions in real work area by eliminating the suspicious hazards, conducting the individual interaction session and providing the training materials in addition to the handouts; involving the trainer in to field activities to get the recent exposure and make them to utilize the exposure in training. After all these considerations, attractive requirements should be taken because it doesn't yield any dissatisfaction if absent.

From the plot, we can observe that a point in attractive area lies with satisfaction coefficient of more than 0.8 and dissatisfaction coefficient of -0.2 which is considered as most attractive for the participants. The attractive attribute which has the corresponding coordinate of 0.8 and -0.2 is A25. Hence, the attribute A25, providing discount to the participants who appear for the refreshers training should also need to be considered in order to attract a greater number of refreshers for the basic safety refreshers training. The indifferent requirements should be neglected because they are not playing a vital role in the participants satisfaction and no supporting action is required over it. It is also notable that the reverse attribute has occurred around the value of 0.5 in satisfaction coefficient which is gamification features. Mostly the participants are more likely to expect the training with inclusion of the gamification features. But the participants who are mostly as wind workforce doesn't like the gamification features in their training session. Hence, it is also need to be considered while framing the training session.

## 6. CONCLUSION

The increasing trend of the GWO training requirement for the wind workforce is an unrealistic demand which should be achieved with the fulfilment by providing the training without intervention. That leads the training provider to involve themselves in evergreen profession. This can be achieved by the training provider when they have clear understanding of the GWO requirements as well as the participants requirements. This study helped the training provider to determine and prioritize the training attributes related to GWO training which will increase their brand name, shine from the competition and increase the participants return rate for refreshers training and have chance to get recommended by the participants themselves. Kano model has applied to attain the objectives for fixed training facilities. However, the study can be extended to the on-site or digital learning delivery facilities with suitable training attributes. This result can be optimized with QFD to make the training providers to effectively respond to their participants requirements and to shine among their competitors.

## ACKNOWLEDGEMENT

I would like to thank the trainers and the training coordinator who helped to get the feedback from the participants by provide the questionnaires to them and return the all. This study was self-supported.

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## BIOGRAPHY



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