IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE)
e-ISSN: 2278-1684, p-ISSN: 2320-334X
PP 55-59
www.iosrjournals.org

Development in Agricultural Tractor Brakes through QFD Application-A Conceptual Analysis

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ABSTRACT: *In this research paper , collected data from various tractor OEM, Tractor Dealers , tractor owners, farmers, Agricultural industries regarding Engine , Transmission, mounting, accessories , aggregates, load/pulling capacity and requirement of Brake system by application of QFD is designed to help planners focus on characteristics of a new or existing product or service from the viewpoints of market segments, company, or technology-development needs. The technique are analyzed into yields charts and matrices. This database from collection helps transform customer needs (the voice of the customer [VOC]) into engineering characteristics (and appropriate methods like Kano Model) for a the development of Tractor Brake system characteristic while simultaneously setting development targets for Advancement in Brakes & Service.*
In comprehensive & Critically analysis observed that there were changeover of Tractor Brakes in 2005 from Dry & Wetland brake into Oil Immerse Brakes. And slowly changes and shifted to OIB.In this reserch paper also concluded that for lower / smaller engine end tractor there is the major requirements of Low Cost OIB brakes. This type of number of facts & figures , complete comprehensive report of market share of tractor, customer ,end users requirement reflected in this research paper.

Keywords: *Brake, Critically ,Kano Model ,Oil Immerse , QFD, Safety, Tractor*

I. INTRODUCTION

If economic returns are to be realised from agricultural production, the development of the agro-industry Equipments sector as well as commercial farming Equipent and related agricultural enterprises is important in all countries. Although many of the challenges differ between high End Tractor Model and medium & low end tractor Models, it is notable that the need to innovate is common to all. Recent trends high End Tractor Model are demanding by farmers, fleet owners, agro-processors, and other stakeholders improve the efficiency of their operations and be more responsive to consumer demands as well as regulatory frameworks.

In the Tractor OEM industry, just as any other industry, product and process development is considered a vital part – indeed the lifeblood – of smart business strategy. Failure to develop new and improved products relegates firms to competing solely on price which favours the players with access to the lowest cost inputs (land, labour, material etc). Adopting a low cost strategy can have unexpected consequences for the economy as a whole when another country, which has a lower cost structure, enters the market.

Consumers' demands keep changing over time. These changes range from basic considerations such as improving tractor safety, shelf life, and reducing wastage, to demands for increasingly the safest & powered operations of tractor in farms, having special characteristics in terms of technology, palatability, and convenience. The actual product development process is determined by the interaction between consumer expectations and demand, the technical capacity of the tractor OEM, and emerging knowledge Tractor OEM research.

A methodolgy to assess and evaluate customer requirements :

In the following we will explain how product requirements can be classified by means of a questionnaire.

The 150 Tractor customers from various location of Vidarbha region were , interviewed, is used to demonstrate how product requirements are ascertained, how a questionnaire is constructed, how the results are evaluated and interpreted and used as the basis for product development.

Step 1: identification of product requirements—"Walk in your customer's shoes"

Analysing customer problems instead of customer desires

Step 2: construction of the Kano questionnaire

Step 3: administering customer interviews

Step 4: evaluation and interpretation

Evaluation according to frequencies
Customer satisfaction coefficient
Quality improvement index

Indentations and Equations:
Following Questionnaire made for the tractor Owners for getting compressive information for the Tractor Brakes .Total 150 tractor customers interviewed
Figures and Tables

Questionnaire

Name: _____

Tractor Model _____

Brakes System (OIB/Mech/other) _____

Date questionnaire completed: _____

Major Use of Tractor & per day use _____

No.	Question	Answers (select with a X one choice only)
1A	Using Tractor with OIB	____ 1. I like it ____ 2. I expect it ____ 3. I'm neutral ____ 4. I can tolerate it ____ 5. I dislike it

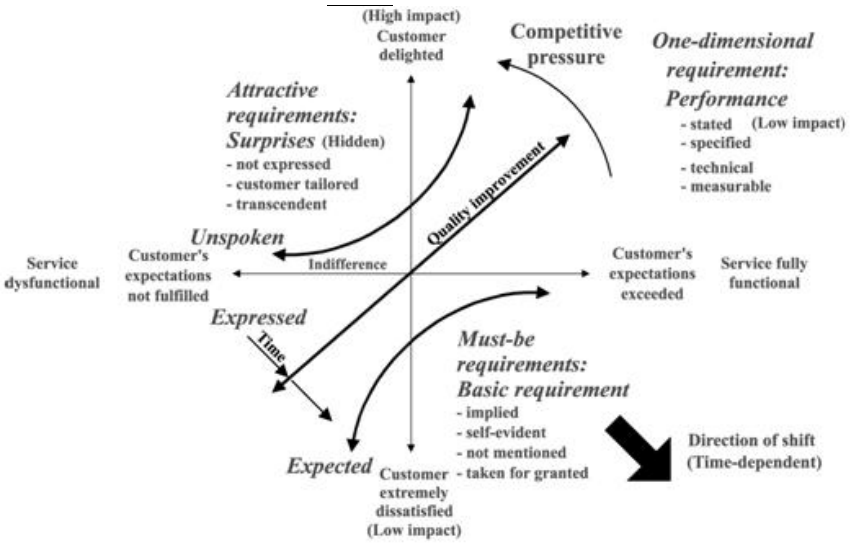

Fig.No 1

The Kano Model of Customer satisfaction (Figure 1) divides product attributes into three categories: threshold, performance,and excitement. A competitive product meets basic attributes,maximises performances attributes,and includes as many "excitement" attributes as possible at a cost the market can bear.

*Threshold Attributes :*Threshold (or basic) attributes are the expected attributes or "musts" of a product, and do not provide an opportunity for product differentiation.

Increasing the performance of these attributes provides diminishing returns in terms of customer satisfaction, however the absence or poor performance of these attributes results in
extreme customer dissatisfaction. An example of a threshold attribute would be brakes on
a Tractor .

Customers should be asked to answer with one of the following responses:

A) Satisfied;
B) Neutral (Its normally that way);
C) Dissatisfied;
D) Don't care.

- Basic attributes generally receive the "Neutral" response to Question 1 and the "Dissatisfied" response to Question 2. Exclusion of these attributes in the product has the potential to severely impact the success of the product in the marketplace.
- Eliminate or include performance or excitement attributes that their presence or absence respectively lead to customer dissatisfaction. This often requires a trade-off analysis against cost. As Customers frequently rate most attributes or functionality as important, asking the question "How much extra would you be willing to pay for this attribute or more of this attribute?" will aid in trade-off decisions, especially for performance attributes. Prioritisation matrices can be useful in determining which excitement attributes would provide the greatest returns on Customer satisfaction.
- Consideration should be given to attributes receiving a "Don't care" response as they will not increase customer satisfaction nor motivate the customer to pay an increased price for the product. However, do not immediately dismiss these attributes if they play a critical role to the product functionality or are necessary for other reasons than to satisfy the customer.

The information obtained from the Kano Model Analysis, specifically regarding performance and excitement attributes, provides valuable input for the Quality Function Deployment process.

Product requirement → / Functional form of the question ↓	Dysfunctional form of the question: 1. I like it that way	2. It must be that way	3. I am neutral	4. I can live with it that way	5. I dislike it that way
1. I like it that way	Q	A	A	A	O
2. It must be that way	R	I	I	I	M
3. I am neutral	R	I	I	I	M
4. I can live with it that way	R	I	I	I	M
5. I dislike it that way	R	R	R	R	Q

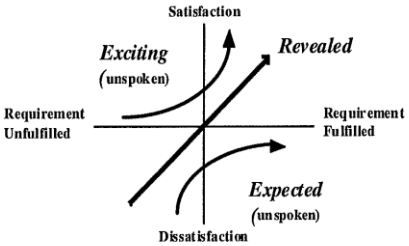

Figure 2. The Kano Model (adapted).
World-class services must meet all three types of requirements - not just what the customer says.

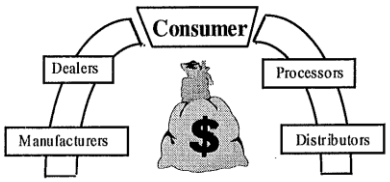

Figure 3. The Keystone Customer.
Who ultimately determines the success or failure of our service?

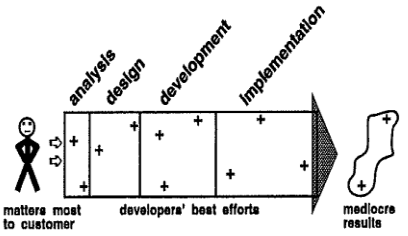

Figure 4. Incoherent Planning and Development. Traditional planning and development fails to focus best efforts. This is inherently inefficient, and dissatisfying.

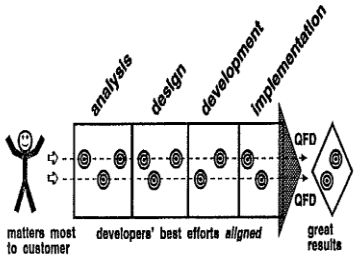

Figure 5. Coherent Planning and Development. QFD targets best efforts on value to the customer. For equivalent effort, more value is received.

II. CONCLUSION

Kano Model can help businesses to find out which requirements they must fulfill (must-be), which requirements they should be competitive (one dimensional), and which requirements bring a differential in the Eyes of the customer

This paper presented a modified Kano Model questionnaire using a Likert Scale in order to identify the degree of satisfaction or dissatisfaction a certain requirement brings to the tractor customers. Based on Brakes . CS-Coefficient, a Modified CS-Coefficient was introduced for using with the degree of satisfaction scale. This modified CS-Coefficient can identify those requirements that really bring distinction to the product or service, and therefore bring competitiveness. It also can identify those requirements that are critical to the customers, and therefore can bring dissatisfaction if they not fulfill customers' expectations. Using a study of 50 tractor customers & their views on Tractor Brakes, the paper showed the correlation between the Berger's CS-Coefficient.

Using the Modified CS-Coefficient, the paper also presented a method of integrating the Kano Model in the Quality Function Deployment (QFD). This new approach overcomes some constrains of previous works by using an adjustment factor to correct the improvement rate in the QFD A-1 Matrix. The adjustment factor is based on the degree of satisfaction or dissatisfaction that a requirement brings to customers instead of the importance rating.

III. ACKNOWLEDGEMENTS

An The authors wish to acknowledge the contribution of case studies and some literature review material by Renske Asma, FAO Volunteer (AGST). The critical review of the paper by Divine Njie, Agro-industries Officer (AGST), was appreciated. The assistance of Larissa D'Aquilio (AGST) and David Ryde in the preparation of the document for publication is gratefully acknowledged.

REFERENCES

Journal Papers:
Adler, M., and E. Ziglio, eds. 1996. Gazing into the Oracle: The Delphi Method and its Application to Social Policy and Public Health. London, U.K.: Jessica Kingsley Publishers.
Ashby, K., and L. Day. 1995. Tractor injuries. In Hazard, 24. Melbourne, Australia: Monash University Accident Research Centre.
Boyle, S., ed. 2001. Talking Tractors II. Perth, Australia: The Kondinin Group.
Brison, R., W. Pickett, L. Hartling, and R. Matys. 1998. Fatal Farm Injuries in Canada, 1990-1996. Kingston, Ontario: Canadian Agricultural Injury Surveillance Program.
Clarke, L., and R. Coleman. 1995. Profile of farm health and safety: A report to Farmsafe. Moree, Australia: Australian Agricultural Health Unit.
Cole, H. P. 2002. Cognitive-behavioral approaches to farm community safety education: A conceptual analysis. J. Agric. Safety and Health 8(2): 145-159.
Davidson, A. 1995. National tractor safety project. Moree, Australia: Australian Agricultural Health Unit. Day, L. 1999. Farm work related fatalities among adults in Victoria, Australia: The human cost of agriculture. Accid. Anal. Prev. 31(1-2): 153-159. Day, L., and A. McGrath. 1999. Unintentional machinery injury on farms in Victoria. Report No. 148. Melbourne Australia: Monash University Accident Research Centre.
Day, L., and G. Rechnitzer. 2004. Safe tractor access platforms: From guidance material to implementation. J. Agric. Safety and Health 10(3): 197-209.

Day, L., K. Ashby, and V. Stathakis. 1997. Non-fatal farm injury in Victoria. In Hazard, 33. Melbourne, Australia: Monash University Accident Research Centre.
Donham, K., D. Osterberg, M. Myers, and C. Lehtola. 1997. Tractor risk abatement and control. The Policy Conference Final Report. Iowa City, Iowa: The University of Iowa. M Ozaki, Y. Adachi, Y. Iwahori, and N. Ishii, Application of fuzzy theory to writer recognition of Chinese characters, International Journal of Modelling and Simulation, 18(2), 1998, 112-116.