# Leveraging Driver Satisfaction through Driving Quality Improvement: A Case Study of Multi Purposes Vehicle Using Structural Equation Modelling

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***Abstract*—Customer satisfaction program of product becomes an important goal at most of manufacturers and needs various effort to make the goal successfully achieved. Previous research and experience proved that product quality was very important aspect but need deeper elaboration of any other cause of satisfaction. A case study of multi purposes vehicle (MPV) and its driver using Structural Equation Modelling with Lisrel software and Anova analysis prepared for this work. Data collecting with questionnaires from 516 car drivers in Jakarta, Bogor, Depok, Tangerang and Bekasi conducted to uncover role of driver related to their post purchase satisfaction of vehicle. Steps of analysis designed to clarify the relationship between quality of vehicle, driving satisfaction and role of driving quality in between. This study found that driving quality moderated the relationship between variables. Lower quality of driving will reduce driving satisfaction even if the quality of vehicle was genuine. A moderating variable role reveal new paradigm in satisfying customer and improving competitive advantage of vehicle manufacturers.**

***Index Terms*—driving quality, driving satisfaction, moderating variable, automobile, structural equation modelling**

## I. Introduction

Customer satisfaction was usually defined in terms of perceived performance of a product or service in relation to the expected performance prior to purchase or use. Two important factors in predicting satisfaction were thus customer expectations and perceived risk. For passenger car, sources of customer satisfaction predicted as band image, customer expectations and perceived quality of car [1]. Some previous research also proposed quality of service [2], product price, mileage of fuel, design and vehicle quality as important variables to support customer satisfaction [3], [4]. Those variables proposed as customer satisfaction predictors that represented vehicle quality and its manufacturer performance including their post purchase service quality.

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Important aspects embedded in vehicle users, and more specific in vehicle drivers had not been considered yet as predictor of satisfaction. As every day experience of utilizing some products, user knowledge, skill and behavior may affect product function and performance, both for low and high quality of product. Improper use of a product tend to downgrade product function and durability that reduce user satisfaction. In the era of rapid growth of technology some features of product sometime are useless because of lack of knowledge or skill in utilizing the features.

In the context of vehicle and its driver, high quality of car would not always satisfy its driver. Driver who has less knowledge about how to drive and manage driving apparatus would suffer in driving and the passengers would not be satisfied too. Bad driving also resulted in bad condition of vehicle that reduce its performance and durability. Therefore vehicle driving constellation considered as interesting topic of research that need a special approach in revealing the relationship. This research explored deeper and more specific of variables that never studied before.

In this research driving satisfaction and driving quality assessed as central concern in this study. Multi purposes vehicle (MPV) drivers were selected as respondents for two important consideration. First, they are need appropriate driving quality that proposed support driving satisfaction. Second, MPV businesses with huge number of sales and tight competition need a new paradigm in satisfying their customers. MPV selected in this research because of this type of vehicle dominates market share of passenger car in Indonesia.

This study aimed to find out a new paradigm in driving satisfaction improvement rather than only improve quality aspects of vehicle as well as post purchase service and maintenance quality.

## II. Methodology

### A. Sample and Research Instrument

Within intensive surveys, a number of 528 MPV owner-drivers in Jakarta, Bogor, Depok, Tangerang and

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Bekasi had responded to a set of questionnaire with tested answers before. The data obtained by questionnaire represents driver perception with scores within Likert scale of 1 to 6. A number of 528 car owner-drivers participated. Of the 528 questionnaires that had been obtained, 12 questionnaires collected were not considered valid because some of the answers were not eligible, therefore only 516 questionnaires considered in the data processing.

### B. Measurement Model

Measurement model is a specification of the measurement that shows how constructs are operationalized by sets of measured items. Confirmatory Factor Analysis (CFA) is used to test the reliability of a measurement model. CFA allows the researcher to tell the SEM program which variable belongs to which factor before the analysis [5]. Salisbury *et al*. [6] mentioned that CFA allows the researcher to specify the actual relationship between the items and factors as well as linkages between them.

According to Hair *et al*. [5] construct validity is the extent to which a set of measured items actually represents theoretical latent construct; those items are designed to measure. The reliability of variables' value scale was examined by specifying a model in CFA using Lisrel 8.8 software. Reliability of an instrument can also be calculated by Cronbach's alpha, but use of SEM technique makes such a practice unnecessary and redundant [7]. According to Hair *et al.* [5] one incremental fit index (IFI), one goodness of fit index (GFI), one absolute fit index and one badness of fit index, with chi-square statistic should be used to assess a model's goodness of fit.

### C. Structural Model

The next step after assessing the eligibility of scale for measuring different variables in the research is to test the hypothesized relationships in a structural model. Some variables affect to post purchase satisfaction, like quality of service, price, brand-image, mileage of fuel, design and vehicle quality [3,1,4]. Some variables affect to passenger car satisfaction identified as vehicle quality [8], brand service quality, brand value, technology anxiety [9], service quality [2], economical to use [10], customer service quality, product quality [11], and maintenance cost, fuel efficiency, comfort [12]. Several independent variables in vehicle quality were proposed as causal factor of customer satisfaction in term of driving satisfaction.

Vehicle quality description varies among previous research. Many of researcher suggest performance as common terminology of quality, some other stated various attributes proposed as quality, including reliability, durability, serviceability, aesthetics, special feature, conformance to specification, technology, convenient, technicalities, speed, consumption of fuel, emission, stability, ease of driving, space utilization, functions and customization.

### D. Data Collection and Analysis

The research subjects were MPV drivers who have responded to a set of questionnaire according to a preliminary model of relationship. The low end quality of MPV used included the brand of Chevrolet (2%), Daihatsu (19%), Honda (11%), Mazda (1%), Nissan (8%), Suzuki (18%) and Toyota (40%). The drivers were asked to explain their experience according to instrument statements by chosen their perceive experience of vehicle quality, driving quality and their Driving Satisfaction (DRS). Latent variables with each number of manifest variables represented in Table I.

As result of literature study of passenger car satisfaction, this study proposed four independent variables as follow: Driving Quality (DRQ), vehicle Reliability (REL), Operational Quality (OPQ), and Functional Quality (FCQ). But according to new insight in this study, Driving Quality (DRQ) variable proposed both as independent and moderating variable. The three independent variables were related and managed by vehicle manufacturers, otherwise, the moderating variable managed by driver of vehicle.

TABLE I. LATENT AND MANIFEST VARIABLES

| No. | Latent Variable | Manifest Variable |
|---|---|---|
| 1 | Driving Quality | DRQ1, DRQ2, DRQ3, DRQ4 |
| 2 | Functional Quality | FCQ1, FCQ2, FCQ3, FCQ4, FCQ5 |
| 3 | Operational Quality | OPQ1, OPQ2, OPQ3, OPQ4, OPQ5 |
| 4 | Reliability | REL1, REL2, REL3, REL4, REL5, REL6 |
| 5 | Driving Satisfaction | DRS1, DRS2, DRS3, DRS4, DRS5, DRS6, DRS7, DRS8 |

The moderating variable was a new variable that have not been introduced before. With 516 drivers' respond of all type of automobile collected after reliability and validity test procedures completed, and then within appropriate skewness and kurtosis, a computer program prepared for SEM. Serial steps of model specification, model identification, model estimation, goodness fit tests, and then re-specification of structural models were conducted in this study.

## III. RESULT

### A. Relationship between Vehicle Quality and Driving Satisfaction

Structural equation according to SEM with 516 samples indicated that T-Statistic Value of three variables to Driving Satisfaction (DRS) support its effect to DRS. Therefore Functional Quality (FCQ), Operational Quality (OPQ) and Reliability (REL) strongly considered as significant cause of Driving Satisfaction (DRS). Evaluation of the structural equation represented in Fig. 1 and Fig. 2 and Table II concluded that the equation with three independent variables and one dependent variable was well accepted according to the good results of standard deviation, T-Statistic Value and P-Value.

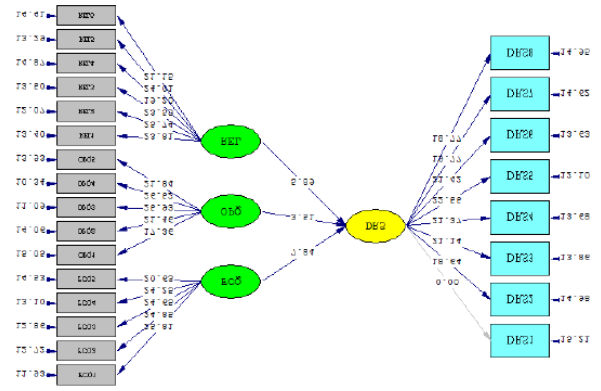

Figure 1. T-Statistic value of structural model between four latent variables.

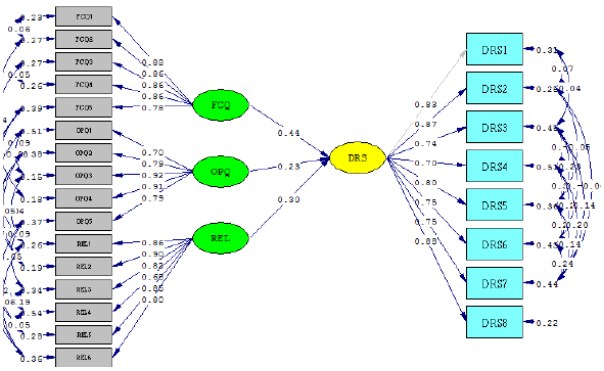

Figure 2. Path coefficient between four latent variables.

TABLE II. EVALUATION OF STRUCTURAL MODEL AMONG FOUR LATENT VARIABLES

| Relationship among variables | Path Coefficient | T Statistic | Relationship |
|---|---|---|---|
| Functional Quality to Driving Satisfaction | 0.44 | 7.84 | Accepted |
| Operational Quality to Driving Satisfaction | 0.23 | 3.51 | Accepted |
| Reliability to Driving Satisfaction | 0.30 | 6.89 | Accepted |

### *B. Effect of Lower and Higher Value of Driving Quality*

The next analysis focused on role of Driving Quality (DRQ) by splitting the value of this variable by lower and higher DRQ value group. Structural equation according to SEM with 258 samples of lower DRQ value indicated that T-Statistic Value of first three variables to DRS were moderated by Driving Quality (DRQ). According to the recent equation, Functional Quality (FCQ) and Reliability (REL) still strongly considered in the next analysis, but Operational Quality (OPQ) became not significant, like the new variable considered in the model, Driving Quality (DRQ). The next analysis continued on the higher value of DRQ. This step resulted that all three previous variables still significant, but the new one (DRQ) was not significant.

Average of Driving Satisfaction (DRS) of lower and higher value of DRQ group were respectively 4.15 and 4.88. Anova analysis result of the two group accepted the hypothesis that the DRS average of the two group was different. Evaluation of the new structural equation represented in Table III and IV.

TABLE III. EVALUATION OF STRUCTURAL MODEL AMONG FIVE LATENT VARIABLES: LOWER VALUE OF DRQ

| Relationship among variables | Path Coefficient | T Statistic | Relationship |
|---|---|---|---|
| Functional Quality to Driving Satisfaction | 0.49 | 8.98 | Accepted |
| Operational Quality to Driving Satisfaction | -0.02 | -0.34 | Rejected |
| Reliability to Driving Satisfaction | 0.33 | 5.70 | Accepted |
| Driving Quality to Driving Satisfaction | -0.07 | -1.55 | Rejected |

No. of Sample = 258; Average of DRS = 4.15

TABLE IV. EVALUATION OF STRUCTURAL MODEL AMONG FIVE LATENT VARIABLES: HIGHER VALUE OF DRQ

| Relationship among variables | Path Coefficient | T Statistic | Relationship |
|---|---|---|---|
| Functional Quality to Driving Satisfaction | 0.35 | 4.63 | Accepted |
| Operational Quality to Driving Satisfaction | 0.28 | 3.88 | Accepted |
| Reliability to Driving Satisfaction | 0.23 | 3.12 | Accepted |
| Driving Quality to Driving Satisfaction | 0.01 | 0.24 | Rejected |

No. of Sample = 258; Average of DRS = 4.88

## IV. DISCUSSION

Driving Quality (DRQ) depend on driver's knowledge, skill and driving commitment as the following manifest variables: Ability to describe good conduct in vehicle driving (DRQ1), Ability to describe driver skill requirements in vehicle driving (DRQ2), Driving skills fulfilment when driving a car (DRQ3), and Commitment for right, safe and good conduct in vehicle driving (DRQ4).

According to the last two structural models with 258 drivers, DRQ not affected to DRS directly, but the average of DRS of two group with lower and higher value of DRQ was well tested as different. This evident indicated that Driving Quality gave indirect effect to Driving Satisfaction. An additional evident indicated that for higher value of Driving Quality group, all of the three independent variables gave positive effect to Driving Satisfaction like the first structural model with 516 drivers. Unlike the last structural model, for lower value of Driving Quality group, its structural model indicated that Operational Quality (OPQ) not significantly affected to DRS.

The new finding delivered precious information both for vehicle manufacturers and vehicle users. For the higher Driving Quality group, the effect of vehicle quality to Driving Satisfaction was well tested and this evident was consistent with previous research and in line of sight with manufacturers' objectives in quality improvement. Their effort will get positive impact to Driving Satisfaction. But for the lower value of Driving Quality group, their average of Driving Satisfaction was well tested as lower than the higher value of Driving Quality group. In other word, benefit of quality improvement reduced significantly, and unfortunately, from word of

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mouth marketing by the lower value of Driving Quality group, brand image of vehicle will also be reduced. This finding was not identified by previous research.

Consequently, vehicle manufacturer that focused its strategy on vehicle quality only, would be less competitive when other manufacturers more care and deliver better support to vehicle drivers in improving their Driving Quality. Smarter manufacturers will take important advantage in their customer satisfaction and loyalty. A good communication, appropriate brochure and effective driver manual delivered to buyers will support driving quality improvement. Driving Satisfaction also could be leveraged with good assistance by qualified driving instructors as compliment of automobile purchase within a strategic and appropriate program of customer relationship management.

## V. Conclusion

Driving quality as moderating variable to vehicle driving satisfaction was well tested by structural equation modelling with Lisrel software and Anova in a case study of multi purposes vehicle (MPV). Genuine quality of vehicle effect to driving satisfaction could be reduced when driving quality was lower. Driver license approval with low standard and weak traffic law enforcement affected not only to unsafe driving, but also reduced driving quality and then reduced driving satisfaction. This finding suggest a new perspective in customer satisfaction improvement that worth both for vehicle manufacturers and car drivers. Introducing good driving tutorials and practices may be a strategic decision of encouraging driving quality improvement and then driving satisfaction.

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