

SUPPLIER SELECTION CRITERION IN AUTOMOTIVE INFOTAINMENT INDUSTRY: EFA MODEL

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ABSTRACT

The purpose of this paper is to identify the important criteria in selecting a supplier in the automotive infotainment industry and its influence on business buyer satisfaction. Selecting supplier is the most critical responsibilities that will affect the price, quality, delivery reliability and availability of the products (Li, 2008). Therefore, it is very important to identify the important criteria in selecting the best supplier as it could improve on the firm's resources and core competencies. A review of the literature reveals that most studies conceptually and theoretically examined the criteria in selecting a supplier in the automotive infotainment industry. Data were collected through a self-administered questionnaire of 50 respondents who work in the infotainment system industry and been exposed to the process of supplier selection process. Factor analysis reveals three criteria of supplier selection that are exceptional product quality, agile delivery performance and fair price.

Key words: Buyer satisfaction, supplier selection, automotive infotainment system

Introduction

Automotive infotainment systems in passenger cars are expected to increase by 2020 due to modern lifestyles and the rise of "always connected" communities. People start to connect not only via smartphones, but also via car to increase their driving experiences. Voice recognition technologies, high definition in dash display monitors, responsive touch screens and intelligent driver distraction mitigation systems are the latest development in automotive infotainment system industry. AUDI AG, Ford Motor Company, Blaupunkt, Clarion Corporation of America and many more has become major players in the industry and Malaysia has become one of the country that has robust growth in middle class population due to rising employment levels, standard of living, increase in discretionary spends, consumer preference for luxury cars, and increase in per capita ownership of cars.

The growing consumer interest in equipping their automobile with the latest technology has made this industry grow and rapid in-car technology revolution in order to increase their long-distance travelling experience more enjoyable than ever. Besides that, with the evolving in-car technologies, it also increases the safeness while driving by providing automotive passive night vision system, pre-crash system technology, brake assisting system and rearview cameras to the driver as well as the passengers.

In infotainment system industry, selecting suppliers are the most crucial responsibilities purchasing function as it will affect the price, quality, delivery reliability and availability of particular products (Li, 2008). Carefully selecting suppliers gives huge impact to the organizations as it can be used to improve the overall competitiveness of the supply chain (Chris, Dunu & Gabremikael, 2010). Furthermore, according to Sezhiyan & Nambhirajan (2010), selecting suppliers are essential for organizations as they allowing them to select the vendor and the decision process is complicated due to many aspects to be considered. Therefore, it is very important for the organization to identify important criteria in selecting the best supplier available in the market. This study was conducted to identify important criteria in selecting automotive infotainment suppliers that will assist the organization in the decision making process. Three (3) criteria have been selected, they are; (1) Price; (2) Quality and; (3) Delivery.

Statement Of The Problem

In selecting a supplier, each vendor or supplier has their own set of criteria practice within the organization. Brief interview with the respondents, 35% of the organization's problem is in selecting suppliers in supplying their components. Therefore, the purpose of this study is to identify the criteria that need to be considered in selecting suppliers and the influence on organization who acts as buyer satisfaction.

Outlining the criteria that can be used in selecting suppliers may assist the organization who is involved in the automotive infotainment system industry to decide which supplier is the best and may improve organization's competitive advantage in the market as it will give many benefits to the organizations as a whole.

Although there are many studies have been conducted in identifying the criteria of selecting suppliers, but not specifically focusing on the infotainment system industry. Therefore, this study is to outline and test the significance of the criteria to the supplier selection process in the industry.

Literature Review

Supplier Selection

Many studies have discussed criteria that can be taken into consideration in selecting suppliers. Dickson (1966) has outlined 23 criteria of supplier selection and Dickson also ranked the 23 criteria based on the importance and the most significant criteria which are quality, delivery and performance history. Other than that, Galego (2011) which is the recent study compared to Dickson (1966) found out that the quality of the product, on-time delivery and supplier performance history are the most important criteria to be considered in selecting suppliers. Therefore, this study will test the 2 most important criteria which are the quality of the product and on-time delivery. According to Li (2008) says that cost (price), quality and service are the main categories when selecting suppliers. In addition, Mwikali and Kanvale (2012) found out that the cost (price), quality and service are the most important criteria. Therefore, this study will also test price variable to be one of the criteria in selecting suppliers in the automotive infotainment industry.

Price

Halldorsson (2013) states price is based on open calculations and major emphasis on continuous improvement in terms of design, quality and cycle time. Besides that, price also can be defined as the total cost of buying a piece of suppliers is composed of two factors which are fixed costs and variable costs (Pushpen, 2008). However, most organizations did not make the decision solely on price of the product, but also other factors, for instances, quality, delivery, after-sales service on time, the buyer-seller relationship and its (Sonmez, 2006). Besides that, price plays a critical criteria in choosing suppliers, especially when buying high tech equipment due to longer time to reach the break-even point (Li, 2008).

Quality

Pushpen (2008) defined quality as the quality of the parts supplied by various suppliers which can be measured by doing a record log of rejection of parts received and recorded in terms of percentage. Besides that, Mwikali & Kanvale (2012) pointed out the dimensions of quality. They are; management commitment; a supplier of product development, process improvement suppliers, planning and quality assurance in the supply chain, in the production of quality assessment, examination and experimentation and quality supplier of staff. In other words, quality can be simply defined as the degree in which customer requirements are met (Gallego, 2011).

Quality consists of certificates, capability of quality management and capability of quality management and capability of handling abnormal quality (Wan, Rahayu, Razali & Zaki, 2014). This will lead to better quality and pollution control. Most organizations will look at the certified quality management system of ISO 9001:2008 before selecting the suppliers. This certification gives assurance to the organization in making the decision.

Delivery

The ability of suppliers to abide the delivery time given means the supplier is easier and more profitable to work with (Mwikali & Kanvale, 2012). In assessing the best delivery performance, it can be measured by assessing the delivery of the order fulfillment rate, percentage of late delivery, lead-time, and location, type of transportation, shipping packaging standards and delivered in good condition. Delivery performance reflects the efficiency of business operations when preparing and delivering orders to customers (Galego, 2011). Therefore, it is a very important criteria to look at when selecting the best performance supplier available.

Research Methodology

A questionnaire was distributed to 50 respondents those who works in the organization related industry and being exposed to the process to the selecting suppliers. Data collected were analyzed and tested using various test, for instances, factor analysis, correlation and regression analysis.

Profiles Of Respondents

From 50 respondents, the majority of the respondents are male (58%) and followed by female (42%). In terms of age, the majority are from age range of 41 to 50 years old (28%) and followed by age range of 21 to 30 years old (26%). As for the experience, 24% of the respondents have up to more than 21 years of experience in the organization and followed by 6 to 10 years of experience by 22%.

Table 1: Respondents profile

Characteristics	%
GENDER	
Male	58%
Female	42%
AGE	
21 - 30	26%
31 - 40	16%
41 - 50	28%
51 - 60	18%
> 61	6%
WORKING EXPERIENCE (YEARS)	
< 1	14%
1 - 5	20%
6 - 10	22%
11 - 15	12%
16 - 20	8%
> 21	24%

Results And Discussion

Table 2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.744
Bartlett's Test of Sphericity	Approx. Chi-Square
	757.527
	df
	66
	Sig.
	.000

Factor analysis was carried out to determine the criteria in selecting a supplier in the automotive infotainment industry. A total number of 12 items were developed regarding the criteria in supplier selection that are price, quality of products and delivery performance were subjected to factor analysis. The Kaiser Meyer Olkin (KMO) to measure the sampling adequacy and The Bartlett's test of sphericity were performed. Based on table 2, The KMO value was 0.744 (cutoff point above.50) while the Bartlett's test was highly significant ($p < .000$). This is a good indicator that data do have patterned relationship and the appropriateness.

Table 3: Rotated Component Matrix

Components	1	2	3
Future price escalation within a contact period should be agreed	.853		
Product/equipment/service fulfills technical specifications and requirements	.864		
Offer warranty	.799		
Offer training and supports on product usage	.856		
Must be certified with relevant quality standard	.824		
Ability to deliver in a timely manner		.662	
Fast response in dealing with customer request		.673	
Imposing late delivery penalty		.647	
Appropriate production planning capability		.588	
Must comply the price schedule and payment terms			.409
Clearly state the maintenance cost price for the warranty and post warranty			.434
Fair spare part cost/price should be considered			.497

Table 4: Rotation sums of squared loadings

Component	Rotation Sums of Squared Loadings		
	Total	% Variance	Cumulative %
1	3.712	30.934	30.934
2	3.494	29.121	60.055
3	3.304	27.536	87.591

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization

Based on table 3, the principal components with varimax rotation only attributes with factor loadings of 0.40 or greater were regarded as significant (Tabachnick & Fidell, 2013). Three components were generated by factors explaining 87% of the total variance. It means that the factors explain 87% of supplier selection criteria and the presence of 3 components with eigenvalues exceeding 1 explaining 58%, 17.9% and 11.5% respectively (see Table 3).

Table 5: Initial Eigenvalues

Initial Eigenvalues			
Component	Total	% of Variance	Cumulative %
1	6.965	58.039	58.039
2	2.156	17.969	76.008
3	1.390	11.583	87.591

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization

The internal consistencies of the variance were performed. A reliability test conducted revealed that all factors had Cronbach Alpha value more than 0.70 that means the variables in the study have a high internal consistency (see table 6).

Table 6: Reliability Test

	Factor Description	Cronbach Alpha
1	Exceptional Product Quality	.945
2	Agile Delivery Performance	.939
3	Fair Price	.917

All factors were named exceptional product quality, agile delivery performance and fair price based on the supplier selection criteria that load highly on each 3 factors. Based on the table 5 results, exceptional product quality is the highest component among others. This factor highlights that increase in product or service's price must be agreed, product or service offered must fulfill technical specifications and requirements, the supplier must offer a warranty, training and supports on product usages and product or service must be certified with relevant quality standard. It indicates that in selecting supplier, the organization must look at into product or service quality as the first priority. This finding is aligned with Halldórsson (2013), Mwikali & Kanvale (2012) and Sonmez (2006).

Next, agile performance delivery was the second factor that relates to supplier selection criterias. This suggests that the supplier must have the ability to deliver in a timely manner, quick response to customer's request, a late delivery penalty will be charged and must have production planning ability. This finding was parallel with Gallego (2011), Akarte et al (2011) and Li (2008) state that delivery performance must be considered in selecting suppliers.

Finally, the third factor in selecting a supplier is a fair price. The supplier should comply the price schedule and payment terms, must clearly state the maintenance cost price for the warranty and post warranty and fair spare part cost or price. This factor also consistent with studies done by Halldórsson (2013), Mwikali & Kanvale (2012), Surazi & Ahmad (2012) and Beil (2009).

Conclusion

The purpose of this study was to identify the criteria in selecting a supplier in the automotive infotainment industry. Based on the results, in selecting a supplier, the business buyer should consider 3 factors. These factors are exceptional product quality, agile delivery performance and fair price. The limitation of the study is the number of respondents involved in the study is lacking. This is due to the number of workers who actively involved in the supplier selection process is small and only limited to automotive infotainment industry. In assessing exceptional product quality, the business buyer should look into supplier's certification, warranty, training and support, the technical specifications and requirement must be fulfilled and the agreed future price escalation. The business buyer should thoroughly check on the supplier's products or services before undergo the selection process. As for agile delivery performance, business buyer should look into a supplier delivery time, speed in dealing business buyer's request and able to impose delivery penalty on the supplier. Thus, business buyer must look into existing buyer that have made a transaction with the supplier. Besides that, suppliers must comply the price schedule and payment terms set, business buyer must thoroughly look at the maintenance price for warranty and post warranty. Furthermore, the business buyer should look into the spare part or cost offers by supplier. The objective of this study has been achieved by identifying 3 criteria that contribute to the selection process of supplier in the automotive infotainment industry and this finding may benefit business

buyer as it outlined the criteria in selecting the best supplier available. It also assists business buyer in the dimension on each criteria and make better decision-making process in supplier selection. This study also serves as an academic contribution. It provides insights on the supplier selection criteria in the automotive infotainment industry specifically. Future studies may conduct more in depth study using more total respondents in the industry as well as other industries.

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