Surveying effect of supply chain management components on organization performance in Iran automotive casting industrial

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Abstract

Supply chain management has been considered by many researchers in order to coordinate the chain members in this new age so that it is considered as a strategic approach for demands, operations, procurements and managing logistical processes. The present study deals with survey of supply chain management components and their effect on organization performance. The research conceptual model has been obtained from merging several models into each other and the statistical society of the research has included the companies that produce automotive casting parts. The conceptual model hypotheses were tested through statistical analysis. The findings resulting from this study showed that some supply chain management components are correlated with each other positively and each one affects on the organizational performance. Thus, the top managers should establish this approach in order to achieve competitive advantages against their competitors so that they can obtain the advantages arising from them.

KEYWORDS: Supply Chain Management, Organization Performance, supplier participation, supplier development, supplier selection, customer participation.

1. Introduction

The Supply Chain Management includes collaborations made by the companies in order to improve the operational efficiency [1] and is a set of guidelines for integrating the chain members (suppliers, manufacturers, distributors, retailers and final customers) that its purposes are reducing system costs and increasing customers service level and implies effective use of the supplier base to facilitate the supplier relationships management, developing strategic relationships with suppliers, working with suppliers to ensure that expectations are met and involvement of suppliers in the product development process to use from their capabilities [2].

Supply chain management is trying to integrate and coordinate processes through all the involved institutions in order to guarantee that quality of product or service will lead to ultimate customer satisfaction [3, 4] and therefore requires managing stream of between and within chains to maximize its total profit. The importance of supply chain management can be assessed by the amount of expenses that the organization has been suffered during materials and components purchasing from suppliers [5].

In this paper, the supply chain management and its components including suppliers participation, suppliers development, suppliers selection and customers participation are

analyzed and their effect on organizational performance will be studied using structural equations model method and via the Amos software.

2. Research background and assumptions

The supplier selection strategy includes some qualitative and cost considerations [6, 7, 8, 9]. Some researchers demonstrated that supplier selection strategy separates companies having good performance with the companies not having somehow good performance [10, 11]. Other researchers have also claimed that the supplier assessment practices are related with company performance [9, 11].

Supplier selection on the basis of the on time delivery index will result in management of inventories with high level of confidence and in accordance with Kaynak theory, there is a direct relationship between inventory management and the quality performance so that the lower inventory level makes potential issues easy to identify and in case of occurrence of the quality problems, it will result in less returns and reworks [12]. As well as dealing with a small number of the suppliers, since the purchasers are able to draw more attention toward every supplier, it facilitates solving the quality issues and delivery [13, 14]. Thus:

H1: The supplier selection has a direct effect on the organization performance.

Strategic partnership with suppliers enables the organization in order to expand boundaries to obtain accessibility to valuable specialized capabilities from the suppliers [15, 16]. Vong et al. administrated an experimental study about the operational managers in Hong Kong and made use of structural equations in order to study the interactions between producers and suppliers. They found that factors including partnership, trust and long-term relationships are the factors which promote quality among the members of the supply chain [17].

From the perspective of the supply, the active participation and involvement of the supplier positively influences the operational performance of the buyer companies. Besides, participation made by the supplier positively affects on the trading performance of buyer companies [2]. The organizational performance may be optimized when the organization considers its suppliers as the major trading partners and members for the value chain. Also, the quality extends over in order to turn into an important attribute in each relationship that exists between the organization and its suppliers [18]. Other researchers also showed that collaborating with the suppliers in designing for new product are related to higher quality products [18, 19, 20]. The results of studies made by Tracey and Vonderembse also show that there is a relationship between participation of supplier and the organizational performance [7]. Therefore supplier involvement has relationship with satisfaction level of customers and performance of the company [9, 21]. Thus:

H2: The supplier participation has a direct effect on the organization performance.

Implementing the supplier quality assurance positively affects the operational results of purchasing function [5, 22, 23, 24]. This impact may result from high reliability level and in this case, the organization will decrease all the unexpected stops within the

production process due to the existence of non-conforming materials. In addition, it may appear in a flexibility context and if this happens, the inventory levels will be reduced through the effective quality assurance practices and accelerates meeting market demands. However, this effect can emerge in shape of quality improvement and reduced number of the defective products. In addition, these actions may lead to reduce costs including reworking the defective products and inventory storage and in that way, it is possible to decrease the number of the defective and unrecyclable products and also the material consumption rate [5]. Thus:

H3: The supplier development has a direct effect on the organization performance.

The customer participation regarding product design is a key factor to achieve the quality performance and can result in customer satisfaction [25, 26, 27]. An environment where the customer collaboration is the main focus, in particular, for designing both product and process, it makes accessibility to a high level of the quality performance feasible [25, 26]. Also, Forza and Flippini demonstrated that customer involvement during product design and process design lead to minimize the number of quality problems [26]. Thus:

H4: The customer participation has a direct effect on the organization performance.

The organizations establish some participatory relationship with their key suppliers in order to improve. The quality of products in an organization is not only determined through the application of internal processes of the organization, but it is also affected by means of materials and components provided by the suppliers and their costs and the delivery function [28]. Thus:

H5: supplier selection and supplier participation are significantly correlated.

Developing relationships with the suppliers will improve the performance of suppliers and buyers particularly when the quality and on time delivery are the buyer preferences [28, 29, 30]. In addition, keeping a small number of suppliers improves both quality and productivity of the products of purchasers by means of encouraging commitment of the supplier for product and quality design [12, 13, 31, 32].

The participation of the suppliers in the quality control activities is possible through establishing strong, independent and long-term relations with the suppliers [33, 34]. The successful relationships encourage the suppliers to quickly involve themselves in affair of buying the product/service designing and give some suggestions in relation with the product or simplifying its components [5]. Chapman and Carter also showed that the successful cooperation of customer and supplier can lead to the advantage of reducing inventories for both parties [35]. In addition, by considering the variability of the supplier products, the performance of a supplier may be enhanced when an organization is working with a few suppliers and if it provides them necessary training and technology and monitors their performance [36]. Thus:

H6: supplier participation and supplier development are significantly correlated.

Until present, no specific studies have been presented regarding relationship between the approaches of supplier selection and supplier development; however, it may be stated

that some of the main indicators for selecting suppliers including selection based on the quality of raw material or on time delivery of the items have forced the suppliers to improves this indicators in a manner that it will lead to their growth and development from various aspects. Thus:

H7: supplier selection and supplier development are significantly correlated.

3. Research methodology

3.1. Sample

The statistical society of the current research consists of the foundry companies having more than 100 people as human resources in Iran which manufacture the automobile parts (22 companies). Since the mentioned statistical society is limited, therefore, the whole society has been studied instead of using sampling and as a result 240 managers and experts of these companies, from departments of quality, commercial, engineering and production answered the research questionnaires.

3.2. Data and Scale

In this study, the questionnaire has been used for data measurements. The questionnaire variables were extracted by the professionals having enough specialization in areas being studied as well as research literature. In addition, the questionnaire for increasing the data accuracy has been selected having the format of 10 options. Since the scales for evaluating mental and quantitative performance are correlated and have significant relationships [37] and also since no performance indicator has been presented for the studied organization, the mental and judgmental evaluation of the experts have been used for the present research. To collect data by considering the research literature, a questionnaire with 42 indicators have been collected. Then, for the purpose of obtaining the research objectives and answering the research questions, the mentioned questionnaire having a 10-points range was distributed among the experts (statistical society). After collecting necessary data and information by means of questionnaire, the data analysis was made by SPSS and Amos software applications. Therefore, seven Cronbach's alpha reliability tests were made on the variables of the conceptual model. Then, the structural equations model was created by Amos software application in order to reject or accept the correlation existing between conceptual model variables and to identify the significance of relationship between independent and dependent variables.

3.3. Validity

The purpose of validity is that the measuring tool is able to measure the required attribute. The significance of validity is to the extent that any inappropriate and insufficient measurement can disvalue each scientific research or make it inadmissible. In fact, validity refers to the accuracy and preciseness of measurements done by the researcher. In this study, in order to prove the fact that the questionnaire enjoys a good level of validity, the statements of understandable and without ambiguity have been applied for the design of the questions. After completing the questionnaire design in two stages the experts views were used for increasing the validity. Finally, the questionnaire was made available for 25 members of the statistical society and in accordance with

corrective views of these people; it was ensured that the questions are all in association with the research concept and the conceptual model.

3.4. Reliability

Reliability is one of the technical specifications of the measuring tools and it points out the fact that whether the result of a research is similar to the previous one or not if it is conducted based on the previous conditions and is implemented once again? In this study, in order to determine measuring tool reliability, the internal consistency measurement method has been used by means of measuring Cronbach's Alpha Coefficient. Although, the minimum acceptable amount for this coefficient must be 0.7, the amounts of 0.6 and even 0.55 are also acceptable [38, 39]. The questionnaire of the present research is reliable because the Cronbach's alpha coefficient calculated for the supplier selection, supplier development, supplier participation, customer participation, organizational performance and the Cronbach's alpha coefficient for the total model is more than 0.7.

4. Findings

The collected data and information are considered as basic resources that should be analyzed and explained by suitable tools in order to be able to convey their applicable informational capacity. For this type of research, the statistical tests are the most convenient tool for data analysis. The raw data are analyzed using statistical techniques and after processing make available for the users in the shape of information.

4.1. Research conceptual model

The conceptual model of present study has been shown in figure 1. The structural equations model of the conceptual model has been also designed by Amos software and the indicators of model suitability and research hypotheses test will be presented next.

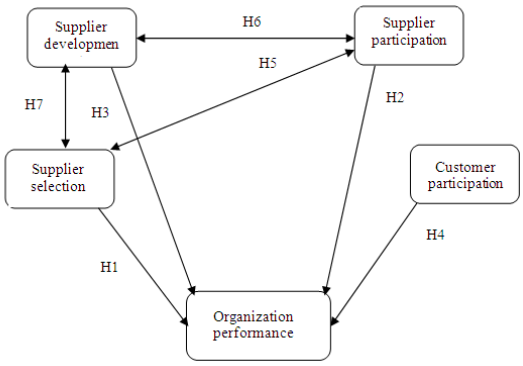

Fig. 1. Research conceptual model

The components of supply chain management being studied in this study include supplier selection, supplier development, supplier participation and customer participation. The criteria for selecting supplier have been studied based on the indicators of price, on time delivery, quality, flexibility and innovation. The development of

supplier includes promotion of supplier quality system, improvement of supplier processes, exchanging information with supplier, supplier quality control and products development of the supplier including design, industrialization, simplification and standardization of product and/or the product elements. Supplier participation also includes their active participations in product/service design, improving organization processes, identifying their raw material consumption amount and consistency of these materials with other elements of organizational process, exchange of information in relation with quality of the raw materials, organization quality control activities, product development of the organization including design, industrialization, simplification and standardization of product and/or its components and improvement of quality system of the organization. Customer participation includes product/service design of the organization, improvement of processes of organization, exchange of information in relation with mutual scopes of working, quality control activities of the organization, product development of the organization including design, industrialization, simplification and standardization of the product and/or its components and promotion of quality system of the organization.

The effect of supply chain management components mentioned above was evaluated on the indicators of organizational performance in this study. The performance indicators in this study includes the customer satisfaction, organization productivity, quality, market share, on time delivery, financial status, competiveness, staff satisfaction, return of capital and profitability.

4.2. Suitability indicators

The acceptable scientific parameters for approving theoretical model formulated using the collected data constitute the main study about the indicators of model suitability. Indices that are sometimes referred to as the suitability goodness of fit indicators (since the more the amount of those indicators increases, it will be interpreted as a symbol of stronger data support of the theoretical model) and sometimes as the suitability badness of fit indicators (since the more the amount of those indicators increases, it will be interpreted as a symbol of weaker data support of the theoretical model). More than thirty indicators of model suitability have been introduced and most of which are reported in the output of Amos. In spite of the fact that there are a huge number of these indicators, most authors are in agreement about classifying them within three main groups; however, few of them agree about how much each of them are advantageous. Three general groups of the model suitability indicators consist of absolute suitability indicators, comparative suitability indicators and parsimonious suitability indicators. The mentioned model has been analyzed by all three indicator types. In this study, the GFI suitability indicator has been selected and it amount has been estimated equal to 0.927. However, this indicator is strongly affected by the sample volume and it can show very high amounts for very weak formulated models, thus not using these indicators has been mutually agreed. CFI comparative suitability indicator has also been selected as a comparative suitability index. Amount of 0.95 or more for this index indicates a good model. The amount of CFI index in the present model has been estimated as 0.982. Therefore, the model has the necessary capability. For parsimonious suitability indicators, root mean square error of approximation (RMSEA) and normalized chi-square (CMIN/DF) have been selected. The

RMSEA is based on analyzing the residual matrix and against many other suitability indicators in modeling that only have point estimation, this indicator is also estimable for different confidence intervals. The acceptable models have 0.05 value or smaller amount for this indicator; however, values less than 0.1 are also approved. The suitability of the models having higher than 0.1 values is estimated to be weak. In the present study, RMSEA value has estimated as 0.091 and the research model is verifiable. The CMIN/DF index is one of the general indicators for considering free parameters in estimating indicator of suitability which is calculated by dividing chi-square to degree of freedom of the model and is reported by label of CMIN/DF. The majority of researchers accept values between 2 to 3; however, the viewpoints are different in this regard. Different researchers accept values between 1 to 5, values between 2 to 3 and values between 1 to 3. In the present study, the value of 2.958 has been estimated for this index and considering the mentioned explanations, the model is approved.

4.3. Testing the hypotheses

The Amos software outputs in form of estimation of regression weights which have been shown in table 1 and show the correlations between the variables as presented in table 2:

Table 1. Estimation of regression weights

Standardized Regression Weights: (Group number 1 - Default model)	Estimate	P
Organization performance <--- Supplier selection	.314	***
Organization performance <--- Supplier development	.164	***
Organization performance <--- Supplier participation	.306	***
Organization performance <--- Customer participation	.277	***

Considering the table 1, the amount of 0.314 was estimated for the effect of supplier selection on the organizational performance, value of 0.306 as the effect of supplier participation on organizational performance, 0.164 as the supplier development effect on the organizational performance and value of 0.277 as the customer participation on organizational performance and considering the P-Value (tiny amount), the hypotheses of 1, 2, 3 and 4 are approved.

Table 2. Variables correlation

Correlations: (Group number 1 - Default model)			Estimate	P
Supplier selection	<-->	Supplier development	1.145	***
Supplier development	<-->	Supplier participation	1.152	***
Supplier selection	<-->	Supplier participation	1.109	***

Considering table 2, the estimated value of 1.145 for correlation between the supplier selection and supplier participation, value of 1.152 as the supplier participation and supplier development, value of 1.109 as the supplier selection and supplier development, and considering the amount of P-Value (tiny amount), the hypotheses of 5, 6 and 7 are approved.

5- Discussion and conclusion

Supply chain management is a strategic approach for demands, operations, procurements and managing logistical processes. The importance of Supply chain management approaches have been already approved in many studies and their impact on various performance indicators including the customer satisfaction, wastages, productivity and so on has been approved. Therefore, within the last decade, the necessity of establishing it in the production and service providing companies have been highly taken into account so that the auto-manufacturing companies have obliged themselves to establish these approaches for their own suppliers. All members of the organization should understand their own working procedures including who their customers are, what are the customer requirements and expectations and how they can related those requirements and expectations with their own suppliers. The satisfaction of the final customers is met only if the whole supply chain becomes integrated, harmonized and committed to be able to follow up integrated and innovative functions

The organizations should be draw special attention on selecting the suppliers of the raw materials and selection of the suppliers at least on basis of indicators like quality, on time delivery, participating in improvement of organizational processes, flexibility and innovation and after them the indicators of price, financial potential and validity and so on. Also, the managers of organizations should attempt to develop the suppliers of their strategic products and take part in supplier quality system promotion plans, developing the processes of suppliers, exchanging information with suppliers, supplier organization quality control and development of products of suppliers like designing, industrialization, simplification and standardization of product and or its components. The organizations should attempt for making their customers take part in improving the performance indicators and assist the organization in designing of product/service of organization, improving organization processes, exchanging information in relation with the mutual working scopes, organization quality control activities, product development including

design, industrialization, simplification and standardization of product and/or its components and promotion of the quality system of the organization.

6. References

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