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A model for evaluating performance of food industries supply chain management in Rasht Industriasl Town

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ABSTRACT: Supply chain management, in 21st century, became important in improving organizations' ability to compete in the market and a significant progress is observed in this field. Supply chain management faces numerous challenges such as developing trust and cooperation among partners in the supply chain, determining best actions to integrate supply chain, successful implementation of modern technologic and information systems which are known as main motives of efficiency, performance and quality of the supply chain. The present paper used statistical – descriptive method and employs questionnaire as main data gathering tool. The population consists of all food industries managers and experts in Rasht Industrial Town (410 individuals) of which the researchers selects 199 individuals as samples by random ordinal sampling. Based on main objective and model, the research aims to investigate the relationship between six variables (costs, supplier, flexibility, customer, time and process) on supply chain's performance and their contribution in it. Findings indicate that all variables have a positive relationship with supply chain's performance. Besides, each variable's contribution is also predicted.

Keywords: supply chain's performance, costs, supplier, flexibility, customer, time, process

INTRODUCTION

In modern markets competition among companies and use of different techniques is highly increasing and changing. To be active in this area fundamental changes are necessary in every organization. Survival of a company depends highly on how it meets customers' primary needs. It is difficult for organizations to meet all their own needs, thus outsourcing strategy is one of their main tools. Today, Iranian managers face the problem of evaluating their performance. Using proper tools and having performance indicators enable them to be aware of their own performance status in comparison with other local or foreign rivals. Supply chain's proper performance plays a key role in an organization's success and permanent achievement of its goals, especially profitability. Therefore, it is recommended to establish a system to evaluate supply chain's performance in order to improve it continuously. Appropriate supply chain means just-in-time production, just-in-time delivery and controlled costs, from supplier to customer. Hence, developing a system to measure supply chain's performance can be highly effective in achieving just-in-time production and delivery. Most organizations have realized the importance of financial and non-financial performance evaluation but they fail to present it in a balanced framework. Respecting the research topic (presenting a conceptual model for evaluating food industries supply chain management performance in Rasht Industrial Town) and based on previous studies, the present paper tries to localize, help managers improve their performance and determine right and basic measures. Therefore, this paper aims to present a conceptual model for evaluating supply chain's performance in order to improve supply chain management performance and achieve pure production.

Review Of Literature

In today's markets competitive and technological factors are increasingly improving and this puts organizations in trouble with producing what they need. With the increase in globalization approach and focus on customers more attention and sensitivity has tended toward logistics in organizational planning (Manian & Dehgha Niri, 2010, p68). Supply chain management is an approach recently developed in this field

(Gunasekaran, Patel, & Tirtiroglu, 2005). Supply chain management, in 21st century, became important in improving organizations' ability to compete in the market and a significant progress is observed in this field (Schneeweiss, Zimmer & Zimmermann, 2004). Supply chain management faces numerous challenges such as developing trust and cooperation among partners in the supply chain, determining best actions to integrate supply chain, successful implementation of modern technologic and information systems which are known as main motives of efficiency, performance and quality of the supply chain (Robinson & Malhotra, 2005).

Considering these points, the more companies move toward supply chain management, the more necessary becomes supply chain's performance evaluation. Supply chain management experienced a significant growth in expansion of theories and actions in the past decade. Of course, it is noteworthy that researchers and experts have not paid enough attention to the issue of supply chain performance evaluation (Theeranuphattana & Tang, 2008). Many companies use supply chain management for continuous improvement, as a tool for enhance competitive powers. They failed in maximizing their supply chain's potential power since they cannot develop required measures and indicators to fully integrate the supply chain (in order to maximize efficiency and efficacy). Lee & Billington, (1992) observed that separate places in supply chain do not maximize efficacy if each follow a separate goal. They pointed to deficit measure of supply chain evaluation in different industries. The measures must be perceived by all components of the supply chain and the least opportunity should be available for manipulation.

Performance evaluation is vital for every organization's success since it facilitates behavior understanding, forms it and improves the ability to compete (Fawcett & Cooper, 1998). In organizational level performance evaluation usually focuses on tangible and financial factors (Austin, 1990). Neely, Gregory and Platts (1995) define performance evaluation as "quantification of effectiveness and efficiency of actions".

Effectiveness is the extent to which customers' needs are met and efficiency measures the value of economic use company's resources while developing a predetermined level of customer satisfaction. Lebas (1995) explains performance evaluation as transmitting the complex reality of performance into a sequence of limited signs which can be transferred and reported under identical circumstances. He believes that the objective of performance evaluation is to measure a company's efficiency and efficacy. Chan and Qi (2003) believe that a well-designed performance measuring system is considered as an important factor in effective planning and system control and significantly helps business managers supervise performance, enhance motivation, improve communications and identify problems. Sink and Tuttle (1989) claim that one can not manage what he can not measure and they presented this as the main cause of measuring and evaluation.

Performance evaluation provides important feedback data which enables managers to supervise performance, manifest progress, enhance motivation and communications and identify problems (Rolstandas, 1995; Waggoner, Neely and Kennerley 1999). Performance evaluation is an inseparable part of effective planning, control and decision-making (Wagner et al, 1999). Thor (1994) claims that there must be a family of measures and criteria; a balance collection composed of four to six measures usually including efficiency, quality and customer satisfaction. All together, these factors give a full view of performance consequences. To emphasize on importance of performance evaluation Gong et al point to case study of "Boston Consultancy Group" in which only some companies achieve their goals in technological innovations and satisfactory results and this requires performance evaluation (Gong, 2008). Chen and Palraj believe that supply chain performance evaluation facilitates better understanding the supply chain itself, positively affect agents' behavior and improves total performance (Chen & Palraj, 2004).

Despite numerous studies on supply chain performance evaluation in various industries in Iran, no research is done on food industries, especially in Guilan province, yet. The present paper tries to present a model for evaluation of good industries supply chain to facilitate decision-making process for all managers. The model can be considered as a tool for self-evaluation and supply chain performance measurement in food industries and be applied by managers in decision-making procedures. In fact, finding a proper model for evaluation of a company's performance requires investigation of internal process of the organization and competitive environment outside it. Determining the main structure of the research and considering strategy and performance indicators of the organization it is possible to establish an appropriate framework to evaluate company's performance.

Here, components including costs, supplier, flexibility, customer, time and process are considered as independent variables and there relationship with (and contribution in) supply chain performance is the dependent variable of the research.
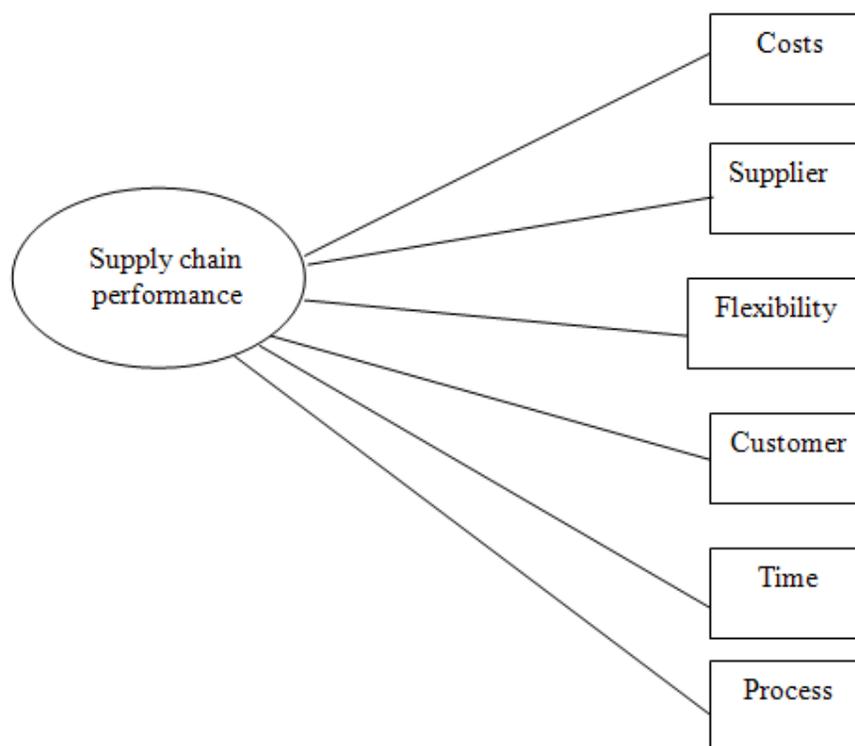
Fig 1. Research Theoretical framework or Paper's analytical model (proposed model of the research)

The model first identifies the six key factors (costs, supplier, flexibility, customer, time and process) based on previous studies and theories and, then, presents appropriate sub-criteria for evaluation of each factor. Finally, it investigates the relation between every factor and supply chain performance evaluation.

Research objectives
Respecting the research topic following objective are defined for this paper:
1. To evaluate costs of supply chain performance
2. To evaluate supplier in supply chain performance
3. To evaluate flexibility in supply chain performance
4. To evaluate customer in supply chain performance
5. To evaluate time in supply chain performance
6. To evaluate process in supply chain performance

Research Hypotheses
Based on the research topic following hypotheses are proposed for this study:
1. There is a significant relationship between supply chain performance and costs.
2. There is a significant relationship between supply chain performance and customer.
3. There is a significant relationship between supply chain performance and supplier.
4. There is a significant relationship between supply chain performance and flexibility.
5. There is a significant relationship between supply chain performance and time.
6. There is a significant relationship between supply chain performance and process.

RESEARCH METHODOLOGY

Considering research types, this paper is an applied study. Data is gathered by descriptive method and it is considered to be a field study. It is an applied research since its results can be used for all other groups of managers and planners. Besides, it is a descriptive study since it is accomplished without any change in components and variables. Food industries in Rasht Industrial Town form the field of this study.

As mentioned earlier, research population consists of all managers and experts of food industries in Rasht Industrial Town (410 individuals) of which 199 are selected as samples.

Hypotheses Testing
Examining hypotheses testing

First hypothesis
There is a significant relationship between costs and supply chain performance.
- There is no significant relationship between costs and supply chain performance (H_0)
- There is a significant relationship between costs and supply chain performance. (H_1)

Table 1. Correlation coefficient of costs and supply chain performance

Dependent variable	Independent variable	Correlation coefficient	R^2	Significance	Independent variable coefficient	Constant
Supply chain performance	Costs	0.671	0.451	0.000	0.424	2.35

Based on above table correlation coefficient of this hypothesis's variables is 67.1% and its significance level is $P < 0.000$. This indicates the positive correlation between costs and supply chain performance and shows the significance of relationship between these two variables (in confidence level of 99%). In other words, with 99% confidence, H_0 is rejected and H_1 is accepted. Thus, the first research hypothesis, there is a significant relationship between costs and supply chain performance, is confirmed. Moreover, it can be said, based on value of R^2, that 45.1% of changes in supply chain performance of studied companies are explained by variable of costs.

Second hypothesis
There is a significant relationship between customer and supply chain performance.
- There is no significant relationship between customer and supply chain performance (H_0)
- There is a significant relationship between customer and supply chain performance. (H_1)

Table 2. Correlation coefficient of customer and supply chain performance

Dependent variable	Independent variable	Correlation coefficient	R^2	Significance	Independent variable coefficient	Constant
Supply chain performance	Customer	0.574	0.329	0.000	0.426	2.38

Based on above table correlation coefficient of this hypothesis's variables is 57.4% and its significance level is $P < 0.000$. This indicates the positive correlation between costs and supply chain performance and shows the significance of relationship between these two variables (in confidence level of 99%). In other words, with 99% confidence, H_0 is rejected and H_1 is accepted. Thus, the second research hypothesis, there is a significant relationship between customer and supply chain performance, is confirmed. Moreover, it can be said, based on value of R^2, that 42.6% of changes in supply chain performance of studied companies are explained by variable of customer.

Third hypothesis
There is a significant relationship between supplier and supply chain performance.
- There is no significant relationship between supplier and supply chain performance (H_0)
- There is a significant relationship between supplier and supply chain performance. (H_1)

Table 3. Correlation coefficient of supplier and supply chain performance

Dependent variable	Independent variable	Correlation coefficient	R^2	Significance	Independent variable coefficient	Constant
Supply chain performance	Supplier	0.748	0.56	0.000	0.521	1.97

Based on above table correlation coefficient of this hypothesis's variables is 74.8% and its significance level is $P < 0.000$. This indicates the positive correlation between costs and supply chain performance and shows the significance of relationship between these two variables (in confidence level of 99%). In other words, with 99% confidence, H_0 is rejected and H_1 is accepted. Thus, the third research hypothesis, there is a significant relationship between supplier and supply chain performance, is confirmed. Moreover, it can be said,

based on value of R^2, that 56% of changes in supply chain performance of studied companies are explained by variable of supplier.

Fourth hypothesis
There is a significant relationship between flexibility and supply chain performance.
- There is no significant relationship between flexibility and supply chain performance (H_0)
- There is a significant relationship between flexibility and supply chain performance. (H_1)

Table 4. Correlation coefficient of flexibility and supply chain performance

Dependent variable	Independent variable	Correlation coefficient	R^2	Significance	Independent variable coefficient	Constant
Supply chain performance	Flexibility	0.325	0.124	0.000	0.409	2.41

Based on above table correlation coefficient of this hypothesis's variables is 32.5% and its significance level is $P < 0.000$. This indicates the positive correlation between costs and supply chain performance and shows the significance of relationship between these two variables (in confidence level of 99%). In other words, with 99% confidence, H_0 is rejected and H_1 is accepted. Thus, the fourth research hypothesis, there is a significant relationship between flexibility and supply chain performance, is confirmed. Moreover, it can be said, based on value of R^2, that 12.4% of changes in supply chain performance are explained by variable of flexibility.

Fifth hypothesis
There is a significant relationship between time and supply chain performance.
- There is no significant relationship between time and supply chain performance (H_0)
- There is a significant relationship between time and supply chain performance. (H_1)

Table 5. Correlation coefficient of time and supply chain performance

Dependent variable	Independent variable	Correlation coefficient	R^2	Significance	Independent variable coefficient	Constant
Supply chain performance	Time	0.735	0.541	0.000	0.463	2.28

Based on above table correlation coefficient of this hypothesis's variables is 73.5% and its significance level is $P < 0.000$. This indicates the positive correlation between costs and supply chain performance and shows the significance of relationship between these two variables (in confidence level of 99%). In other words, with 99% confidence, H_0 is rejected and H_1 is accepted. Thus, the fifth research hypothesis, there is a significant relationship between time and supply chain performance, is confirmed. Moreover, it can be said, based on value of R^2, that 54.1% of changes in supply chain performance are explained by variable of time.

Sixth hypothesis
There is a significant relationship between process and supply chain performance.
- There is no significant relationship between process and supply chain performance (H_0)
- There is a significant relationship between process and supply chain performance. (H_1)

Table 6. Correlation coefficient of process and supply chain performance

Dependent variable	Independent variable	Correlation coefficient	R^2	Significance	Independent variable coefficient	Constant
Supply chain performance	Process	0.576	0.332	0.000	0.371	2.65

Based on above table correlation coefficient of this hypothesis's variables is 57.6% and its significance level is $P < 0.000$. This indicates the positive correlation between costs and supply chain performance and shows the significance of relationship between these two variables (in confidence level of 99%). In other words, with 99% confidence, H_0 is rejected and H_1 is accepted. Thus, the sixth research hypothesis, there is a significant relationship between process and supply chain performance, is confirmed. Moreover, it can be said, based on value of R^2, that 33.2% of changes in supply chain performance are explained by variable of process.

CONCLUSION

In this paper the research was mostly focused on investigating the relationship between considered variables with (and their effect on) supply chain performance. Hence, questionnaires containing 36 questions were conducted and distributed among samples. The six research hypotheses were confirmed based on results of correlation coefficient calculation:

It is perceived, based on results, that independent variable of supplier has the highest relationship (74.8%) with dependent variable of supply chain management performance in food industries. This means that there is a positive and significant relationship between these two variables. Moreover, supplier has an effect of 0.56% which indicates that 56% of changes in supply chain management performance of considered companies are influenced by the variable of supplier in respondents' viewpoint.

It is perceived, based on results, that independent variable of time has a relationship of 73.5% with dependent variable of supply chain management performance in food industries. This means that there is a positive and significant relationship between these two variables. Moreover, time has an effect of 0.541% which indicates that 54.1% of changes in supply chain management performance of considered companies are influenced by the variable of time in respondents' viewpoint.

It is perceived, based on results, that independent variable of costs has a relationship of 67.1% with dependent variable of supply chain management performance in food industries. This means that there is a positive and significant relationship between these two variables. Moreover, cost has an effect of 0.451% which indicates that 45.1% of changes in supply chain management performance of considered companies are influenced by the variable of cost in respondents' viewpoint.

It is perceived, based on results, that independent variable of process has a relationship of 57.6% with dependent variable of supply chain management performance in food industries. This means that there is a positive and significant relationship between these two variables. Moreover, process has an effect of 0.332% which indicates that 33.2% of changes in supply chain management performance of considered companies are influenced by the variable of process in respondents' viewpoint.

It is perceived, based on results, that independent variable of customer has a relationship of 57.4% with dependent variable of supply chain management performance in food industries. This means that there is a positive and significant relationship between these two variables. Moreover, customer has an effect of 0.329% which indicates that 32.9% of changes in supply chain management performance of considered companies are influenced by the variable of customer in respondents' viewpoint.

It is perceived, based on results, that independent variable of flexibility has a relationship of 35.2% with dependent variable of supply chain management performance in food industries. This means that there is a positive and significant relationship between these two variables. Moreover, flexibility has an effect of 0.124% which indicates that 12.4% of changes in supply chain management performance of considered companies are influenced by the variable of flexibility in respondents' viewpoint.

Suggestions

Food industries producers and suppliers of the province must cooperate to plan products and processes, to predict and plan for production and new quality enhancement methods. Furthermore, food industries producer and supplier should interact closely share their personnel and engineers. The manufacturer must have agents for quality control, cost reduction and inventory management in the supplier company and use participatory models.

Suppliers should use modern tools and equipments to meet producers' needs and design their production system based on them. Also, manufacturers should adapt with suppliers' capabilities.

It is suggested to suppliers and producers to cooperate in an integrated system with participation, information sharing and negotiation in order to manage supply chain effectively. This means rapid flow of information among customers and suppliers, distributors and transportation system and enables companies to develop very efficient supply chains. Suppliers and customers must have same objectives and mutual trust. Customers must trust on suppliers about quality of products and services. Besides, they must participate in supply chain planning to achieve common goals and facilitate communications and information flow. Some companies try to control their supply chain through public vertical control and using ownership and integration of all different parts along the supply chain, from providing raw material to delivering final product or service to the customer.

Today, the role and importance of information is evident for every one. Proper circulation and transfer of information makes processes more efficient and effective and facilitates managing them. In the field of supply chain the issue of harmony and integration is of great importance. It is also true in information management in the chain, information system management and information transfer. Coordinated and harmonic information management among partners rapidly affects speed, precision, quality and other aspects.

The most important factor in supply chain management is relationship management in supply chain. It has a significant effect on all aspects of supply chain and its performance level. In most cases technological and information systems necessary for supply chain management activities are simply accessed and can be completed and employed in a relatively short period of time. But most primary failure in supply chains are caused by weak transfer of expectations and are the consequence of behaviors of parties involved in the chain.

In addition, reliable relationship between managers is the most important factor effective on successful supply chain management. thus, it is suggested to managers to trust on each other's capabilities and operations since developing trust among partners is critical to achieve success in developing and expanding and integrated supply chain.

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