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Effect of supply chain management on company performance and acquirement of competitive advantage (case study: Alborz Khosh-Poush clothing production company)

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Abstract: Supply chain management is a newly emerging branch of management that is developing and progressing day by day and increasingly seeks ways of decreased cycle of merchandise production and provision of ideal services until the product reaches the customer. In this study, the descriptive method has been used to collect information from the Alborz Khosh-Poush (well-dressed) Company by way of group interview of experts. For this purpose and with analysis of data using the fuzzy Dematel technique, research questions have been addressed. Results showed that in the view point of experts in this study, the Alborz Khosh-Poush production company can gain competitive advantage by participating in supply chain management activities. As a result, with creation of differentiation in competitive advantage in comparison to competitors in the market, organizational performance of the company can be improved and increased satisfaction and profit for stock holders and company benefactors can be gained.

Key words: Supply chain management activities; Competitive advantage; Company; Fuzzy Dimatel

1. Introduction

Since 1990 when competition became more pronounced and markets advanced towards world encompassment, challenges were introduced regarding product or services acquisition in appropriate locations, in ideal time and with minimum expenditures. As a result, organizations understood that for improved efficiency the focus should not only be on inside the company but also all parts of the production chain they are active in. Understanding the activities of supply chain management has become a necessary prerequisite for persistent competition in the dimension of world presence and improvement of profiting-both in a particular organization and the supply chain- and improved long term performance of the company and the entire supply chain. The purpose of supply chain management by coordination between business partners is: improved performance of a particular organization and improved total performance of the supply chain. This interest can be reached by cohesion of information and material flow across the entire supply chain (Lee et al., 2006).

In the 1990's decade, many industry directors recognized that for sustenance in the market in addition to improving internal processes and flexibility in company capabilities, suppliers of parts and materials should also provide products with the best quality and least cost of production and merchandise distributors should also have close relations with producer market development policies. With such an outlook, supply chain approach and its management came into being (Turban and King, 2006).

In today's worldly competitions, various products need to be provided based on customer request. Consumer interest in high quality and provision of speedy services has led to increased pressures that did not exist in the past. As a result, companies cannot perform all these responsibilities on their own any more. In the present competitive market, economic and production agencies in addition to attending the organization and internal resources find themselves in need of management and supervision over resources and elements related to outside the company. Therefore, now a day supply chain management is important as one of the sub structural bases for electronic business implementation. Supply chain management (SCM) is a process that performs the latter in a way that customers can receive trustable and rapid service with high quality products at minimum costs.

The philosophy of supply chain management is one that is related to the past two decades. Conditions that lead to definition and design of such outlook is by day by day increased competitiveness and endeavor for sustainability of organizations which is a product of communications and progress in information technology. Organizations consider the secret of survival in provision of the needs of the customers. Needs and interests of the consumer can include decreased prices, timely transportation, appropriate quality and etc. SCM is an outlook based upon which these needs are provided not only by the last entity connected to the customer (whose output is the final product) but also by other higher up

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providers. In other words, not just one provider but a number of them are involved.

SCM is a phenomenon that has come to existence in the 1990's decade and performs this responsibility in a way that customers can receive dependable and rapid service with high quality products at the least price.

2. Study theoretical principles and background

Supply chain management includes flow of raw material, information, money and services by the suppliers of primary material and reaches final customers by way of factories and distributers. Additionally SCM includes organizations and processes by which products, information and services are provided for the final customer (Turban and King, 2006).

Therefore, it can be understood that the concept of supply chain arises from the style of communication between partner organizations and their collaboration with each other (Azimi and Safari, 2007).

Three important flows exist in the supply chain which is: material, information and financial flow. Material flow includes physical products, new raw material and supplies flowing in the chain. Information flow includes all matters including demand, merchandise and orders. Financial flow includes all cash transfers, payments, payment plans and electronic payments and matters related to credit (Shafizadeh, 2004).

SCM is collaboration of companies for improvement of strategic position and effectiveness of performance of the collection. This value creating cohesive process needs to be managed from provision of material to supply of merchandise/product to the final customer (Bowersox et al., 2002).

The definition of the MIT University for supply chain management is as follows:

Integrated supply chain management is a cohesive processing approach for supply, production and distribution of products and services to customers. SCM has a wide domain which includes: small scale suppliers, bulk suppliers, internal activities, bulk customers, small scale customers and final consumers. The supply chain exists in production factories, service companies and even in homes and it is also referred to as demand chain or chain of value. Regardless of its name, its purpose is creation of value for the final costumer (Saeedikia and Mozafarifard, 2000).

According to the belief of Norris (2000), the electronic supply chain management is application of electronic technology particularly the web in agency to agency processes for improvement of speed, concurrent control and satisfaction of the customer. In addition, activities such as planning, coordination and control are included.

One or a group of performance criteria are used for determination of level of efficiency and effectiveness of the system. Effective performance criteria have characteristics that influence their way of evaluating the present system (Lee and Wang, 1998). Chan has identified seven characteristics that show the performance of the supply chain. Two are completely quantitative (expenditure and use of resources) and the other five are qualitative (quality, flexibility, clarity, confidence, innovation).

Competitive advantage is the level of increased attraction by a company's propositions in comparison to competitors in the opinion of the customers (Kagan, 2000). Company performance refers to how a company attains its market centered and financial goals (Yamino et al., 1999).

Lee and colleagues in 2006 while evaluating the effect of supply chain management styles on competitive advantage and company performance found out that methods of SCM including strategic collaboration with the supplier, relations with the customer, level of sharing of information, quality of information and internal valuable methods sharing have direct correlation with competitive advantage. Additionally, competitive advantage and SCM activities can be effective on organizational performance.

Gunasekaran and colleagues in 2008 while emphasizing the dynamic quality of the supply chain noted direct correlation between strategic collaboration with suppliers, relations with the customer and information systems with competitive advantage.

TS Chan and colleagues in 2003, while classifying evaluations of the performance of SCM into two groups qualitative and quantitative emphasized the positive correlation between information sharing and strategic communications with the supplier and customer with competitive advantage.

Rupelder in 2004, while evaluating the competitive advantage of production companies has emphasized a positive correlation between strategic connection and collaboration of producers and customers with competitive advantage.

Sharma and colleagues in 2007, while using the cohesive approach of BSC-AHP for evaluating SCM have emphasized positive effect of relations with the customer and valuable internal methods on competitive advantage.

3. Study questions

The purpose of this study was evaluation of the relationship between activities of SCM, competitive advantage and organizational performance. With this regard the following questions arise:

1. Is there a correlation between SCM activities and competitive advantage?
2. Is there a correlation between SCM activities and organizational performance?
3. Is there a correlation between competitive advantage and organizational performance?

4. Methods

This study regarding the kind of question asked and data collection is a descriptive research. It is also a field study and correlational. Since it has been performed in a real, objective and live company and its results can be scientifically used, it is also an applied research.

5. Study variables

This study has three variables including SCM activities as an independent variable with a qualitative characteristic and interval measurement scale, competitive advantage as a dependent variable with qualitative characteristic and interval measurement scale and organizational performance as a dependent variable with qualitative characteristic and interval measurement scale.

6. Study population

The study population includes the Khosh-Poush Production Company in the Province of Alborz.

7. Methods of data collection

In this study for access to theoretical information (present studies and identifying the criteria and concepts used) library research and for extrusion of needed information for analysis of data field study (distribution of questions among experts) was used. Of the most important tools used in this study are record of interviews that by reference to analysis by research experts (guiding and counseling professors) has acceptable validity and reliability.

8. Method of data analysis

Of the most important methods used for information analysis was the fuzzy Dimatel technique which was executed with the help of Excel software and the information calculation process was performed.

Dimatel was first used by American scientists for solving complex problems in science and human programs between the years 1972 and 1976. Dimatel has been based on the theory of Graph and it has the ability to analyze and solve problems with Fig.ming This approach is a structural modeling based on direct graph matching on the basis of a causality Fig. that determines the relationship between factors and the level of effect of each of them. By this method, all factors in a system are divided into two groups affected and affecter and help researchers' gain better understanding regarding structural relations between the system components and find solutions for solving problems of complex systems.

Considering that for use of the Dimatel method opinions of specialists are needed and these views are inclusive of ambiguous and two sided verbal expressions, for cohesive purposes and clearance of ambiguity, it is better to transform these expressions into fuzzy numbers.

Following is a description of the steps of the fuzzy Dimatel model:

First step: the aim of decision making is identified and a committee is formed for collection of opinions for solving the problem.

Second step: Determination of evaluation criteria and design of a fuzzy verbal scale

Due to facing ambiguities in human evaluations, the comparative scale common in the Dimatel method was not used and instead the fuzzy verbal scale suggested by Lee (1999) was taken advantage of. Various degrees of effectiveness have been expressed by five terms: very much, much, little, very little, ineffective and fuzzy triangular and positive numbers pertaining to them have been shown in the following table and figure.

Table 1: Correspondence of verbal expressions with verbal values

verbal values	verbal expressions
(0.75-1-1)	(VH) Very Height impact
(0.5-0.75-1)	(H) Height impact
(0.25-0.5-0.75)	(L) Low impact
(0-0.25-0.5)	(VL)Low impact Very
(0-0-0.25)	(NO) No impact

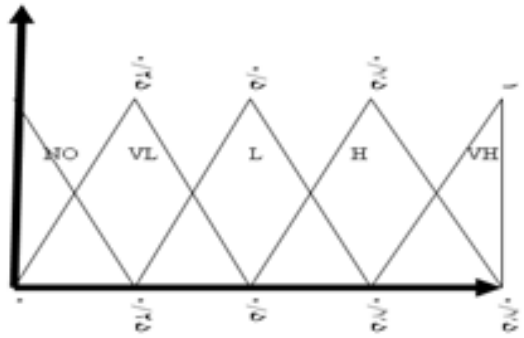


Fig 1: Fuzzy triangular numbers for verbal variables

Third step: Evaluations of the decision makers are to be collected.

For determination of the relationship between the criteria $C = \{C_i \mid i = 1, 2, \ldots, n\}$, a decision making group composed of p specialists are questioned so a collection of pair comparisons based on verbal expressions are obtained. Therefore a number of p fuzzy matrices $Z^{(1)}, Z^{(2)}, \ldots, Z^{(p)}$ are prepared using the opinions of each specialist.

Expression (1):

$$\tilde{Z}^{(k)} = \begin{bmatrix} 0 & \tilde{Z}_{12}^{(k)} & \cdots & \tilde{Z}_{1n}^{(k)} \\ \tilde{Z}_{21}^{(k)} & 0 & \cdots & \tilde{Z}_{2n}^{(k)} \\ \vdots & \vdots & \cdots & \vdots \\ \tilde{Z}_{n1}^{(k)} & \tilde{Z}_{n2}^{(k)} & \cdots & 0 \end{bmatrix} \qquad k = 1, 2, \ldots, p$$

In which the fuzzy matrix $Z^{(k)}$ is called the initial direct-relation fuzzy matrix of the kth specialist.

Fourth step: obtaining the normal matrix of the direct fuzzy relation.

Assume that $\tilde{a}_i^{(k)}$ are fuzzy triangular numbers,

Expression (2):

Expression (3):

$$\tilde{a}_i^{(k)} = \sum_{j=1}^{n} \tilde{Z}_{ij}^{(k)} = \left(\sum_{j=1}^{n} \lambda_{ij}^{(k)}, \sum_{j=1}^{n} m_{ij}^{(k)}, \sum_{j=1}^{n} u_{ij}^{(k)} \right)$$

$$r^{(k)} = \max_{1 \le i \le n} \left(\sum_{j=1}^{n} u_{ij}^{(k)} \right)$$

Next, for transforming the scale of the criteria to a comparable scale, linear scale transformation in the form of normalization formula is used. The normalization matrix of the direct fuzzy equation of the kth specialist namely $\tilde{X}^{(k)}$ is shown as below;

Expression (4):

$$\tilde{X}^{(k)} = \begin{bmatrix} \tilde{X}_{11}^{(k)} & \tilde{X}_{12}^{(k)} & \cdots & \tilde{X}_{1n}^{(k)} \\ \tilde{X}_{21}^{(k)} & \tilde{X}_{22}^{(k)} & \cdots & \tilde{X}_{2n}^{(k)} \\ \vdots & \vdots & \cdots & \vdots \\ \tilde{X}_{n1}^{(k)} & \tilde{X}_{n2}^{(k)} & \cdots & \tilde{X}_{mn}^{(k)} \end{bmatrix} \qquad k = 1, 2, \ldots, p$$

In which

Expression (5):

$$\tilde{X}_{ij}^{(k)} = \frac{\tilde{Z}_{ij}^{(k)}}{r^{(k)}} = \left(\frac{\lambda_{ij}^{(k)}}{r^{(k)}}, \frac{m_{ij}^{(k)}}{r^{(k)}}, \frac{u_{ij}^{(k)}}{r^{(k)}} \right)$$

Similar to the regular Dimatel method, we assume that at least one i exists where $\sum_{j=1}^{n} u_{ij}^{(k)} < r^{(k)}$.

This assumption is well met in practice. Next, expressions for algebraic multiplication of a constant number in a fuzzy number or summation of two fuzzy numbers for calculation of the matrix mean $\bar{x}$ are used.

Expression (6):

$$\tilde{X} = \frac{\left(\tilde{X}^{(1)} \oplus \tilde{X}^{(2)} \oplus \ldots \oplus \tilde{X}^{(p)} \right)}{p} \quad ; \quad \tilde{X} = \begin{bmatrix} \tilde{X}_{11} & \tilde{X}_{12} & \cdots & \tilde{X}_{1n} \\ \tilde{X}_{21} & \tilde{X}_{22} & \cdots & \tilde{X}_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ \tilde{X}_{n1} & \tilde{X}_{n2} & \cdots & \tilde{X}_{mn} \end{bmatrix}$$

$$\tilde{X}_{ij} = \frac{\sum_{k=1}^{p} \tilde{X}_{ij}^{(k)}}{p}$$

In which.

The fuzzy matrix $\tilde{X}$ is called the normal direct relation fuzzy matrix. Here, we use the arithmetic mean for cohesion of all the data of the specialists after calculating the normal direct relation fuzzy matrix $\bar{X}^{(k)}$. This method is better than integrating all the data of the specialists after calculation of the initial direct relation fuzzy matrix $\bar{Z}^{(k)}$.

For calculating the overall fuzzy relation matrix, initially convergence needs to be guaranteed. In calculating $\bar{x}^{w}$, we use the estimation equation for multiplication of two triangular fuzzy numbers. Therefore, the constituents of $\tilde{X}^{w}$ are also triangular fuzzy numbers.

Assume and consider the following three definite matrices whose constituents are extruded from $\tilde{X}$:

In accord to the definite situation, we define the overall fuzzy matrix as follows:

Fifth step: implementation and analysis of the structural model.

$$X_u = \begin{bmatrix} 0 & u_{12} & \cdots & u_{1n} \\ u_{21} & 0 & \cdots & u_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ u_{n1} & u_{n2} & \cdots & 0 \end{bmatrix} \quad X_m = \begin{bmatrix} 0 & m_{12} & \cdots & m_{1n} \\ u_{21} & 0 & \cdots & m_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ m_{n1} & m_{n2} & \cdots & 0 \end{bmatrix} \quad X_\lambda = \begin{bmatrix} 0 & \lambda_{12} & \cdots & \lambda_{1n} \\ \lambda_{21} & 0 & \cdots & \lambda_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ \lambda_{n1} & \lambda_{n2} & \cdots & 0 \end{bmatrix}$$

Expression (7):

$$\tilde{T} = \lim_{w \to \infty} \left(\tilde{X} + \tilde{X}^2 + \ldots + \tilde{X}^w \right) = X \times \left(I - X \right)^{-1}$$

Theorem: Assume

$$\tilde{T} = \begin{bmatrix} \tilde{t}_{11} & \tilde{t}_{12} & \cdots & \tilde{t}_{1n} \\ \tilde{t}_{21} & \tilde{t}_{22} & \cdots & \tilde{t}_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ \tilde{t}_{n1} & \tilde{t}_{n2} & \cdots & \tilde{t}_{nn} \end{bmatrix}$$

In which, then: $\tilde{t}_{ij} = \left(\lambda''_{ij}, m''_{ij}, u''_{ij}\right)$:

$$Matrix\left[\lambda''_{ij}\right] = X_{\lambda} \times \left(I - X_{\lambda}\right)^{-1}$$

و

$$Matrix\left[m''_{ij}\right] = X_{m} \times \left(I - X_{m}\right)^{-1}$$

و

$$Matrix\left[u''_{ij}\right] = X_{u} \times \left(I - X_{u}\right)^{-1}$$

Now that $\tilde{T}$ has been obtained, the CFCS method is used for unfuzzying and obtaining the overall relation matrix.

Therefore, for the CFCS method we will have:

If the fuzzy numbers are triangular and $\tilde{n}_k^{def}$ represents their definite value. Additionally, we have (Karkeh Abadi, 2010, 175): $L = \min\left(\lambda_k\right)$ و $R = \max\left(u_k\right);\ k = 1,2,...,n$ و $\Delta = R - L$

Expression (8):

$$\tilde{n}_k^{def} = L + \Delta \times \frac{(m-L)(\Delta+u-m)^2(R-\lambda) + (u-L)^2(\Delta+m-\lambda)^2}{(\Delta+m-\lambda)(\Delta+u-m)^2(R-\lambda) + (u-L)(\Delta+u-m)}$$

9. Findings

Initially and by collecting precise information from the expert group, the company activity environment is evaluated. The expert group has considered the correlation levels as shown in Table 2 for the research conceptual model in the study population.

Table 2: Levels of correlation of study conceptual model variables with verbal variables

Group	Subgroup	Supply chain management activities				Competitive advantage				Organizational Performance		
		Strategic partnerships with suppliers	The sharing of information	The sharing of information	Quality of information sharing	Delays	Cost price	Quality	Reliability	Delivery of product innovation	Time-to-market	Time-to-market	Financial Performance	Production function توابع
Supply chain management activities	Strategic partnerships with suppliers	NO	NO	L	H	VH	H	H	VH	VL	L	H	NO	VH
	The sharing of information	NO	NO	H	H	NO	H	H	VH	L	VL	H	NO	VL
	The sharing of information	VL	L	NO	NO	L	L	NO	VL	VL	NO	VL	L	VL
	Quality of information sharing	NO	NO	NO	NO	NO	NO	NO	VL	VL	NO	VL	L	VL
	Delays	NO	NO	NO	NO	VH	L	VH	VH	NO	H	NO	NO	VH
Competitive advantage	Cost price	NO	NO	NO	NO	NO	L	NO	NO	NO	NO	NO	H	NO
	Quality	NO	NO	NO	NO	VH	NO	NO	NO	NO	NO	L	NO	NO
	Reliability	NO	NO	NO	NO	NO	NO	NO	NO	NO	L	H	NO	L

VH	NO	NO	VL	NO	NO	VH	L	NO	NO	NO	NO	NO	Delivery of product innovation	
NO	NO	NO	NO	NO	VH	NO	L	NO	NO	NO	NO	NO	Time-to-market	
NO	VH	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Financial Performance	Competitive advantage
VH	NO	VL	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Production management performance	
NO	NO	H	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Production function	

When verbal expressions are transformed into fuzzy values, Table 3 is obtained. This table contains three levels low, medium and high that consider a numerical range for the strength of the level of correlations in a triangular format.

Table 3: Level of correlation of the study conceptual model variables with fuzzy numbers

Organizational Performance			Competitive advantage					Supply chain management activities						Group
13	12	11	10	9	8	7	6	5	4	3	2	1	Subgroup	
0.75	0	0.5	0.25	0	0.75	0.5	0.5	0.75	0.25	0.5	0	0		
1	0	0.75	0.5	0.25	1	0.75	0.75	1	0.5	0.75	0	0	1	
1	0.25	1	0.75	0.5	1	1	1	1	0.75	1	0.25	0.25		
0	0	0.5	0	0.25	0.5	0.5	0	0	0.5	0.5	0	0		
0.25	0	0.75	0.25	0.5	0.75	0.75	0	0	0.75	0.75	0	0	2	
0.5	0.25	1	0.5	0.75	1	1	0.25	0.25	1	1	0.25	0.25		
0	0.25	0	0	0	0	0	0	0.25	0.25	0	0.25	0		
0.25	0.5	0.25	0	0.25	0.25	0	0	0.5	0.5	0	0.5	0.25	3	Supply chain management activities
0.5	0.75	0.5	0.25	0.5	0.5	0.25	0.25	0.75	0.75	0.25	0.75	0.5		
0	0.25	0	0	0	0	0	0	0	0	0	0	0		
0.25	0.5	0.25	0	0.25	0.25	0	0	0	0	0	0	0	4	
0.5	0.75	0.5	0.25	0.5	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25		
0.75	0	0	0.5	0	0.75	0.25	0.75	0	0	0	0	0		
1	0	0	0.75	0	1	0.5	1	0	0	0	0	0	5	
1	0.25	0.25	1	0.25	1	0.75	1	0.25	0.25	0.25	0.25	0.25		
0	0.5	0.25	0	0	0	0.25	0	0	0	0	0	0		
0	0.75	0.5	0	0	0	0.5	0	0	0	0	0	0	6	
0.25	1	0.75	0.25	0.25	0.25	0.75	0.25	0.25	0.25	0.25	0.25	0.25		
0	0	0.25	0	0	0	0	0.75	0	0	0	0	0		
0	0	0.5	0	0	0	0	1	0	0	0	0	0	7	
0.25	0.25	0.75	0.25	0.25	0.25	0.25	1	0.25	0.25	0.25	0.25	0.25		
0.25	0	0.5	0.25	0	0	0	0	0	0	0	0	0		
0.5	0	0.75	0.5	0	0	0	0	0	0	0	0	0	8	Competitive advantage
0.75	0.25	1	0.75	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25		
0.75	0	0	0	0	0	0.75	0.25	0	0	0	0	0		
1	0	0	0.25	0	0	1	0.5	0	0	0	0	0	9	
1	0.25	0.25	0.5	0.25	0.25	1	0.75	0.25	0.25	0.25	0.25	0.25		
0	0	0	0	0	0.75	0	0.25	0	0	0	0	0		
0	0	0	0	0	1	0	0.5	0	0	0	0	0	10	
0.25	0.25	0.25	0.25	0.25	1	0.25	0.75	0.25	0.25	0.25	0.25	0.25		
0	0.75	0	0	0	0	0	0	0	0	0	0	0		
0	1	0	0	0	0	0	0	0	0	0	0	0	11	
0.25	1	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25		
0.75	0	0	0	0	0	0	0	0	0	0	0	0		
1	0	0.25	0	0	0	0	0	0	0	0	0	0	12	Organizational Performance
1	0.25	0.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25		
0	0	0.5	0	0	0	0	0	0	0	0	0	0		
0	0	0.75	0	0	0	0	0	0	0	0	0	0	13	
0.25	0.25	1	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25		

To normalize the numbers in Table (2-4) to the descriptive expression

$$\tilde{X}_{ij}^{(k)} = \frac{\tilde{Z}_{ij}^{(k)}}{r^{(k)}} = \left(\frac{\lambda_{ij}^{(k)}}{r^{(k)}}, \frac{m_{ij}^{(k)}}{r^{(k)}}, \frac{u_{ij}^{(k)}}{r^{(k)}} \right)$$

Table 4 is extruded.

Table 4: Level of correlation of the study conceptual model variables with normalized fuzzy numbers

Organizational Performance			Competitive advantage					Supply chain management activities						Group
13	12	11	10	9	8	7	6	5	4	3	2	1		
0.08	0.00	0.05	0.03	0.00	0.08	0.05	0.05	0.08	0.03	0.05	0.00	0.00		
0.03	0.00	0.08	0.03	0.05	0.08	0.08	0.00	0.00	0.08	0.08	0.00	0.00	1	
0.05	0.03	0.10	0.05	0.08	0.10	0.10	0.03	0.03	0.10	0.10	0.03	0.03		
0.00	0.00	0.05	0.00	0.03	0.05	0.05	0.00	0.00	0.05	0.05	0.00	0.00		
0.03	0.00	0.08	0.03	0.05	0.08	0.08	0.00	0.00	0.08	0.08	0.00	0.00	2	
0.05	0.03	0.10	0.05	0.08	0.10	0.10	0.03	0.03	0.10	0.10	0.03	0.03		
0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.03	0.00		
0.03	0.05	0.03	0.00	0.03	0.03	0.00	0.00	0.05	0.05	0.00	0.05	0.03	3	
0.05	0.08	0.05	0.03	0.05	0.05	0.03	0.03	0.08	0.08	0.03	0.08	0.05		
0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
0.03	0.05	0.03	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4	
0.05	0.08	0.05	0.03	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
0.08	0.00	0.00	0.05	0.00	0.08	0.03	0.08	0.00	0.00	0.00	0.00	0.00		
0.10	0.00	0.00	0.08	0.00	0.10	0.05	0.10	0.00	0.00	0.00	0.00	0.00	5	
0.10	0.03	0.03	0.10	0.03	0.10	0.08	0.10	0.03	0.03	0.03	0.03	0.03		
0.00	0.05	0.03	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00		
0.00	0.08	0.05	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	6	
0.03	0.10	0.08	0.03	0.03	0.03	0.08	0.03	0.03	0.03	0.03	0.03	0.03		
0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00		
0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	7	
0.03	0.03	0.08	0.03	0.03	0.03	0.03	0.10	0.03	0.03	0.03	0.03	0.03		
0.03	0.00	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
0.05	0.00	0.08	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8	
0.08	0.03	0.10	0.08	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
0.08	0.00	0.00	0.00	0.00	0.00	0.08	0.03	0.00	0.00	0.00	0.00	0.00		
0.10	0.00	0.00	0.03	0.00	0.00	0.10	0.05	0.00	0.00	0.00	0.00	0.00	9	
0.10	0.03	0.03	0.05	0.03	0.03	0.10	0.08	0.03	0.03	0.03	0.03	0.03		
0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.03	0.00	0.00	0.00	0.00	0.00		
0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.05	0.00	0.00	0.00	0.00	0.00	10	
0.03	0.03	0.03	0.03	0.03	0.10	0.03	0.08	0.03	0.03	0.03	0.03	0.03		
0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11	
0.03	0.10	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
0.10	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12	
0.10	0.03	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13	
0.03	0.03	0.10	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		

When the equation is calculated for the values in Table 4,

$$\tilde{T} = \lim_{w \to \infty} \left(\tilde{X} + \tilde{X}^2 + \ldots + \tilde{X}^w \right) = X \times \left(I - X \right)^{-1}$$

the information in Table (4-4) is obtained.

Table 5: Levels of direct and indirect correlations of the study conceptual model variables with fuzzy values

Organizational Performance			Competitive advantage					Supply chain managementactivities						Group
13	12	11	10	9	8	7	6	5	4	3	2	1		
0.086	0.010	0.063	0.032	0.000	0.085	0.055	0.062	0.078	0.027	0.051	0.001	0.000		
0.129	0.026	0.111	0.067	0.029	0.124	0.091	0.102	0.107	0.056	0.077	0.004	0.002	1	
0.219	0.132	0.237	0.166	0.122	0.206	0.200	0.208	0.173	0.152	0.172	0.090	0.085		
0.004	0.007	0.056	0.001	0.026	0.052	0.053	0.005	0.001	0.053	0.051	0.001	0.000		
0.042	0.019	0.097	0.032	0.056	0.085	0.084	0.014	0.004	0.081	0.077	0.004	0.002	2	
0.148	0.113	0.212	0.122	0.137	0.184	0.180	0.111	0.085	0.166	0.160	0.079	0.075		Supply chain manage mentact ivities
0.004	0.027	0.002	0.001	0.001	0.003	0.002	0.002	0.026	0.027	0.001	0.026	0.000		
0.048	0.060	0.043	0.010	0.031	0.040	0.012	0.011	0.054	0.057	0.006	0.052	0.026	3	
0.141	0.145	0.146	0.091	0.104	0.129	0.100	0.099	0.127	0.134	0.081	0.120	0.092		
0.002	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
0.035	0.055	0.032	0.002	0.026	0.026	0.003	0.002	0.000	0.000	0.000	0.000	0.000	4	
0.113	0.125	0.117	0.069	0.086	0.100	0.075	0.075	0.060	0.063	0.061	0.056	0.054		
0.079	0.005	0.011	0.053	0.000	0.081	0.028	0.080	0.000	0.000	0.000	0.000	0.000		
0.109	0.011	0.026	0.083	0.000	0.111	0.057	0.113	0.000	0.000	0.000	0.000	0.000	5	
0.178	0.094	0.123	0.162	0.072	0.172	0.143	0.174	0.072	0.076	0.074	0.067	0.065		
0.004	0.053	0.027	0.000	0.000	0.000	0.026	0.002	0.000	0.000	0.000	0.000	0.000		
0.009	0.083	0.057	0.000	0.000	0.000	0.052	0.005	0.000	0.000	0.000	0.000	0.000	6	Competitive advantage
0.088	0.154	0.144	0.068	0.061	0.076	0.126	0.079	0.061	0.064	0.062	0.057	0.055		
0.000	0.006	0.028	0.000	0.000	0.000	0.002	0.077	0.000	0.000	0.000	0.000	0.000		
0.001	0.014	0.057	0.000	0.000	0.000	0.005	0.103	0.000	0.000	0.000	0.000	0.000	7	
0.079	0.080	0.139	0.065	0.059	0.072	0.075	0.149	0.059	0.061	0.060	0.054	0.053		
0.026	0.004	0.053	0.026	0.000	0.002	0.000	0.001	0.000	0.000	0.000	0.000	0.000		
0.052	0.009	0.082	0.052	0.000	0.005	0.000	0.003	0.000	0.000	0.000	0.000	0.000	8	
0.133	0.079	0.169	0.120	0.061	0.079	0.074	0.078	0.061	0.064	0.062	0.057	0.055		
0.077	0.002	0.007	0.000	0.000	0.000	0.078	0.032	0.000	0.000	0.000	0.000	0.000		
0.103	0.007	0.017	0.026	0.000	0.003	0.106	0.063	0.000	0.000	0.000	0.000	0.000	9	
0.163	0.082	0.105	0.097	0.065	0.082	0.158	0.138	0.064	0.068	0.066	0.060	0.058		
0.002	0.002	0.005	0.002	0.000	0.077	0.001	0.026	0.000	0.000	0.000	0.000	0.000		
0.006	0.005	0.011	0.005	0.000	0.103	0.003	0.052	0.000	0.000	0.000	0.000	0.000	10	
0.083	0.075	0.093	0.070	0.059	0.150	0.074	0.124	0.059	0.062	0.060	0.055	0.053		
0.006	0.077	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
0.011	0.103	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	11	
0.080	0.143	0.081	0.062	0.055	0.068	0.067	0.068	0.055	0.058	0.056	0.052	0.050		
0.077	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		Organiz ational Perfor mance
0.103	0.003	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12	
0.153	0.070	0.112	0.063	0.057	0.070	0.069	0.069	0.057	0.059	0.058	0.053	0.051		
0.000	0.004	0.051	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
0.001	0.008	0.077	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13	
0.074	0.072	0.156	0.062	0.055	0.068	0.067	0.068	0.055	0.058	0.056	0.051	0.050		

Using equation (8), Table 5 is unfuzzied and the values in Table 6 are obtained.

Table 6: Levels of direct and indirect correlations of the study conceptual model variables with the unfuzzied values

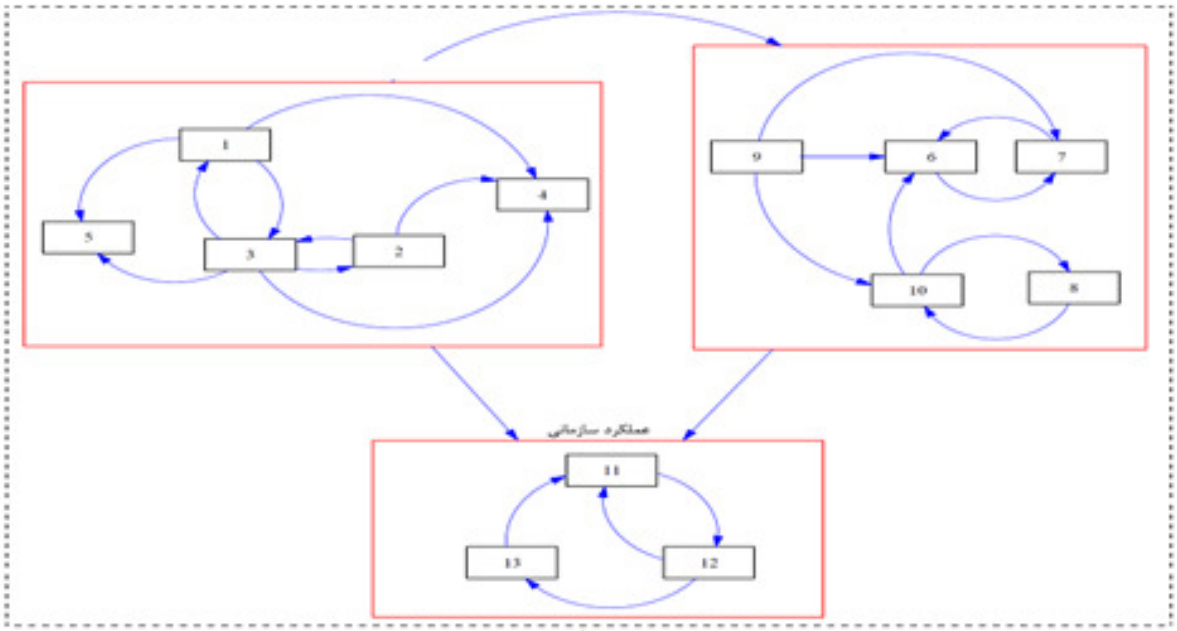
Organizational Performance			Competitive advantage					Supply chain managementactivities					Group	
13	12	11	10	9	8	7	6	5	4	3	2	1		
0.010	0.008	0.013	0.010	0.008	0.009	0.011	0.011	0.007	0.009	0.009	0.005	0.005	1	
0.010	0.007	0.012	0.008	0.008	0.010	0.009	0.006	0.005	0.008	0.008	0.004	0.004	2	Supply chain management activities
0.009	0.008	0.010	0.005	0.007	0.008	0.006	0.006	0.007	0.008	0.005	0.007	0.006	3	
0.007	0.007	0.007	0.004	0.005	0.006	0.004	0.004	0.003	0.004	0.003	0.003	0.003	4	
0.008	0.005	0.007	0.008	0.004	0.007	0.008	0.007	0.004	0.004	0.004	0.004	0.004	5	
0.005	0.008	0.008	0.004	0.003	0.004	0.007	0.004	0.003	0.004	0.003	0.003	0.003	6	Competitive advantage
0.004	0.005	0.008	0.004	0.003	0.004	0.004	0.006	0.003	0.003	0.003	0.003	0.003	7	
0.008	0.004	0.009	0.007	0.003	0.005	0.004	0.004	0.003	0.004	0.003	0.003	0.003	8	
0.007	0.005	0.006	0.006	0.004	0.005	0.006	0.008	0.004	0.004	0.004	0.003	0.003	9	
0.005	0.004	0.005	0.004	0.003	0.006	0.004	0.007	0.003	0.003	0.003	0.003	0.003	10	
0.005	0.005	0.005	0.003	0.003	0.004	0.004	0.004	0.003	0.003	0.003	0.003	0.003	11	Organizational Performance
0.006	0.004	0.007	0.004	0.003	0.004	0.004	0.004	0.003	0.003	0.003	0.003	0.003	12	
0.004	0.004	0.008	0.003	0.003	0.004	0.004	0.004	0.003	0.003	0.003	0.003	0.003	13	

With adjustment of meaningful correlations with attention to the initial levels introduced by the experts, Table 7 is extruded.

Table 7: Levels of modified direct and indirect correlations of the study conceptual model variables with the unfuzzied values

Organizational Performance			Competitive advantage					Supply chain management activities					Group	
13	12	11	10	9	8	7	6	5	4	3	2	1		
0.010	0.000	0.013	0.010	0.008	0.009	0.011	0.011	0.007	0.009	0.009	0.000	0.000	1	Supply chain management activities
0.010	0.000	0.012	0.008	0.008	0.010	0.009	0.000	0.000	0.008	0.008	0.000	0.000	2	
0.009	0.008	0.010	0.000	0.007	0.008	0.000	0.000	0.007	0.008	0.000	0.007	0.006	3	
0.007	0.007	0.007	0.000	0.005	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4	
0.008	0.000	0.000	0.008	0.000	0.007	0.008	0.007	0.000	0.000	0.000	0.000	0.000	5	
0.000	0.008	0.008	0.000	0.000	0.000	0.007		0.000	0.000	0.000	0.000	0.000	6	Competitive advantage
0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	7	
0.008	0.000	0.009	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8	
0.007	0.000	0.000	0.006	0.000	0.000	0.006	0.008	0.000	0.000	0.000	0.000	0.000	9	
0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.007	0.000	0.000	0.000	0.000	0.000	10	
0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	11	Organizational Performance
0.006	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12	
0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13	

If we Fig the level of direct and indirect modified correlations of the study conceptual model variables with the unfuzzied values with attention to the Dimatel network of affecter and affected, Fig. 2 is obtained. In the following and with the purpose of evaluating the purposes of this study using the coefficients of affecting and being affected, the findings are analyzed.



Key:

1 Strategic collaboration with suppliers
2 Customer relations
3 Level of information sharing
4 Quality of information sharing
5 Delays
6 Price expenditures
7 Quality
8 Delivery reliability
9 Innovation in the product
10 Time of market entrance
11 Market performance
12 financial performance
13 Production performances

Fig. 2: Level of direct correlations of the study variables

10. Evaluation of Study Questions:

First study question: Is there a correlation between SCM activities and competitive advantage?

Considering the correlation matrix obtained, the levels of correlation of the subgroups of these two variables can be shown in Fig 3

1-Is there a correlation between SCM activities and competitive advantage?

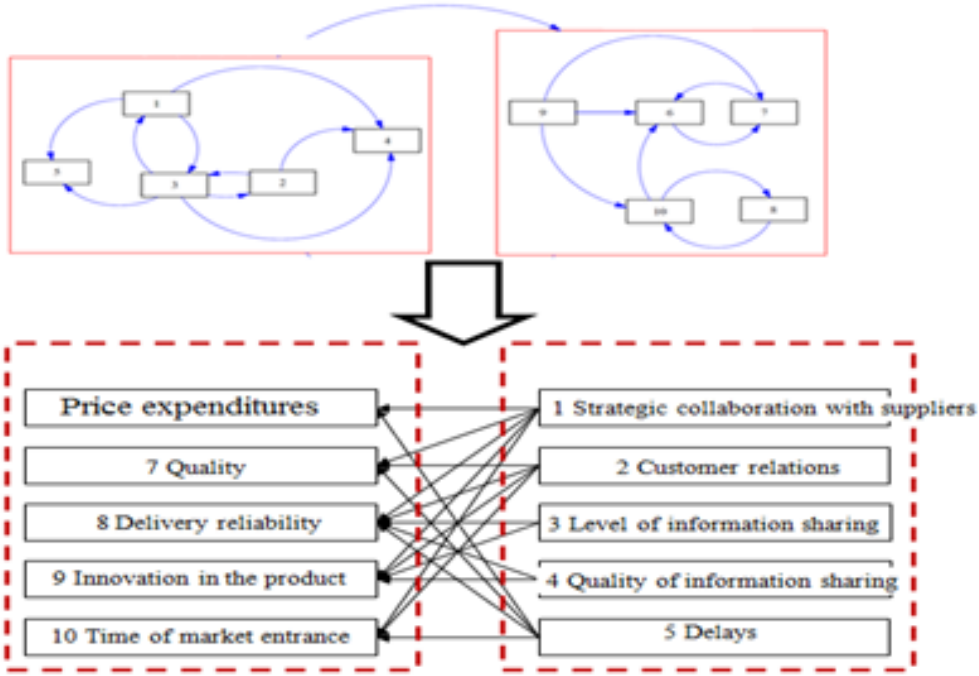


Fig. 3: Correlations between SCM activities and competitive advantage

As shown in Fig. 4, the relationship between SCM activities and competitive advantage are in a unilateral form. Therefore, it is evident that supply chain management can be effective on competitive advantage in the company studied.

Second study question: Is there a correlation between SCM activities and organizational performance?

Considering the correlation matrix obtained, the level of correlation of the subgroups of these two variables can be shown in Fig 4.

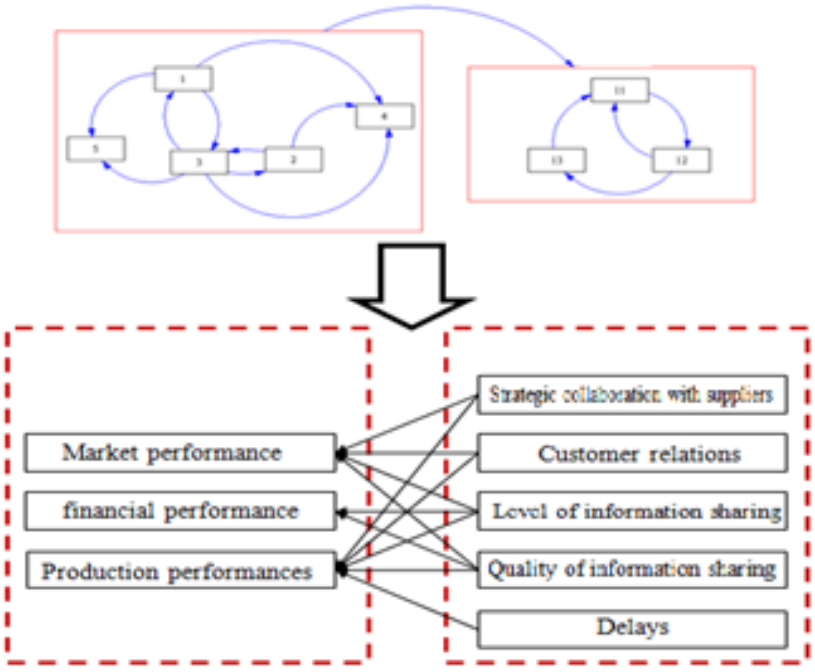


Fig 4: Correlations between SCM activities and organizational performance

As shown in Fig. 5, the relationship between SCM activities and organizational performance is unilateral. Therefore, it is evident that SCM can be effective on the organizational performance of the studied company.

Third study question: Is there a correlation between competitive advantage and organizational performance?

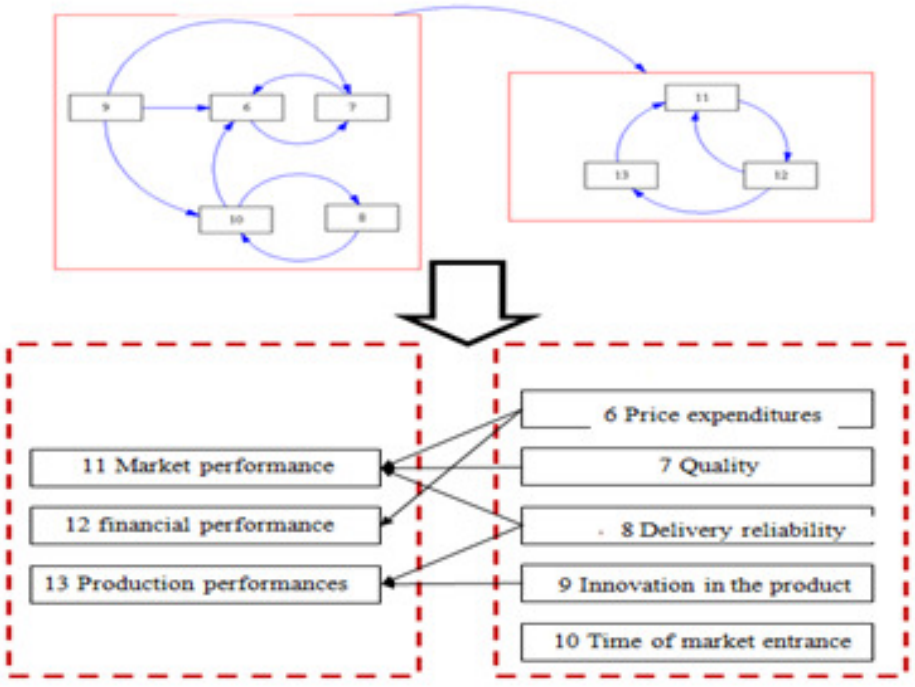


Fig. 5: Correlations between competitive advantage and organizational performance

Considering the correlation matrix obtained, the levels of correlation between subgroups of these two variables are shown in Fig. 6.

As shown in Fig. 6, the relationship between competitive advantage and organizational performance is unilateral. Therefore, it is evident that competitive advantage can be effective on organizational performance in the company studied.

Considering the modified correlations matrix extruded from the Dimatel technique (Table 6), if the degree of correlation for the discovered correlations is determined, the balance Fig. 5 is obtained. Of interest is that effectiveness coefficients have been normalized relative to the sum of effectiveness coefficients of the overall chain. Therefore, sum of all coefficients in Fig 6 is one or 100%.

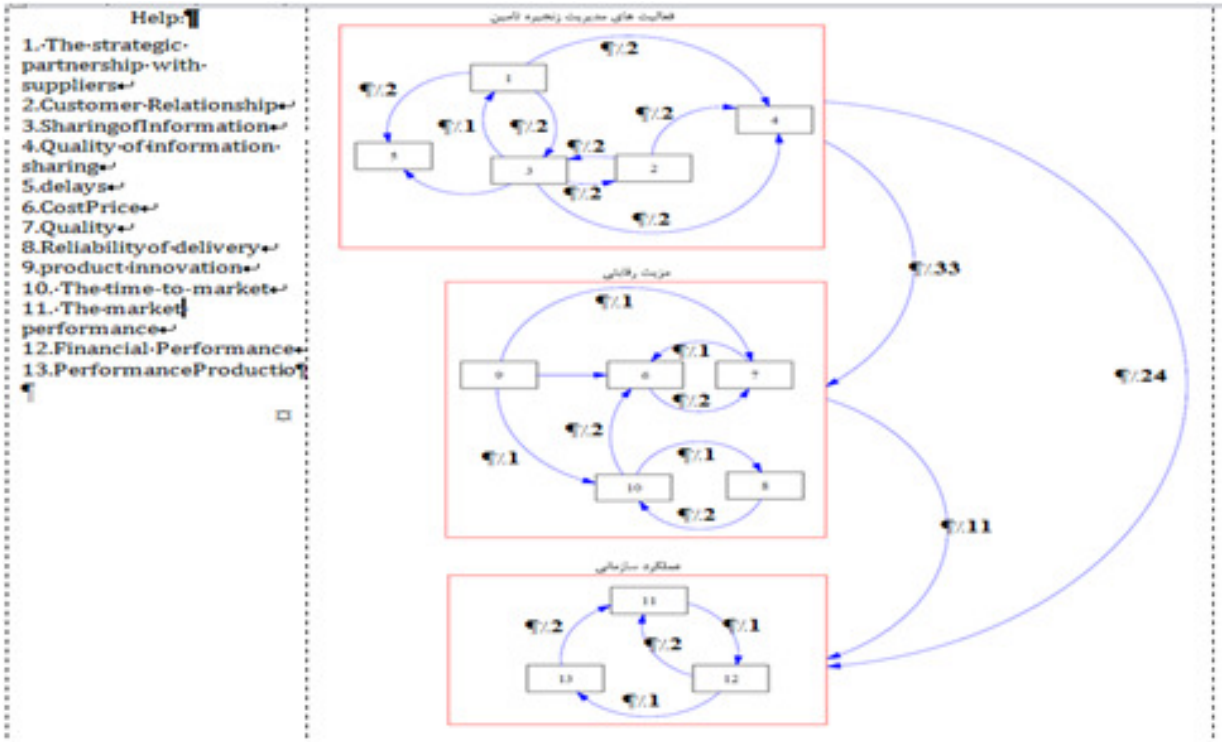


Fig. 6: Levels of direct correlations between study variables and coefficients of degree of effectiveness

This Fig. shows that the degree of inner level correlations is not very valuable with coefficients of one or 2%. Yet, the degree of intra level correlations with coefficients of 33, 24 and 11% has a high share of the chain effects. Another outstanding finding in this Fig. is the 33% effectiveness of SCM activities on competitive advantage.

11. Conclusion

Considering the results obtained from analysis of the data from the study population, the results showed that correlation exists between SCM activities, competitive advantage and organizational performance. In the view point of the expert group in this study, the Alborz Khosh-Poush production company can by way of SCM activities including strategic collaboration with suppliers, customer relations, level of information sharing, quality of information sharing and delays create competitive advantage in costs (price), quality, reliability of delivery, innovation in the product and time of market entrance. Additionally, with supply chain management and improvement of competitive advantage grounds for organizational development and improvement in the market and financial and production domains of the company will be provided.

Therefore, according to effective relationships between the variables of SCM activities, competitive advantage and organizational performance, it can be concluded that in case of establishment or development of SCM activities, the company can by way of creating differentiation in competitive advantage relative to its competitors in the market improve organizational performance and provide for the satisfaction and increased profiting of its stock holders and benefactors.

By referral to the results obtained regarding relationship between the variables of SCM activities, competitive advantage and organizational performance in the study population, it is suggested that future researchers by taking advantage of a study protocol in a wider population compared to this study, discover the level of generalization of the results obtained in various industries.

Additionally, it is suggested that future researchers by discovery of strategies for attaining quantitative data for analysis of the relationship between the variables studied decrease the errors of qualitative data analysis such as the opinions of the expert group.

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