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RANKING FACTORS AFFECTING SUPPLY CHAIN MANAGEMENT IN INDUSTRIES

A CASE STUDY OF SHOKOOHIYEH INDUSTRIAL TOWN, IRAN

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Abstract

This study aims to put forth solutions that can boost the production of industrial organizations by improving the performance of supply chains. By identifying and prioritizing the effective factors in the chain, the importance of each can be assessed. Consequently, by standardizing and improving internal processes, time-efficiency will increase and the quality of products will improve. The study takes a practical approach in categorizing the effective factors in supply chain management of industries. The statistical population for the research comprises of 283 randomly selected managers and employees from five different factories in Shokouhieh Industrial Town, Iran. Two separate questionnaires were used for data collection-one on the Likert scale and the other using Paired Comparison Analysis. Exploratory factor analysis and confirmatory factor analysis of the data (factors affecting the performance of the supply chain) was carried out using SPSS and Smart-PLS and the results were categorized. The study answered two questions: what factors affect the performance of the supply chain and how important each factor is? The results indicated that factors affecting the supply chain include: satisfaction, time, supply and process flexibility. Using these results, the analysis of hierarchical fuzzy triangular Chang in Microsoft Excel to rank these factors in order to improve the supply

chain and increase competitiveness was discussed. The outcome indicated that, in terms of importance, factors affecting the supply chain performance are: satisfaction, process flexibility, security and time. The results of this study can be used to enhance nonstop monitoring, boost production, and to create and sustain competitiveness in industries.

Keywords: Supply Chain, Supply Chain Management, Performance assessment, Fuzzy Analytic Hierarchy Process

INTRODUCTION

In the age of information, organizations become dynamic and insecure day by day and control of these organizations requires novel organizational and management creativities (Daneshyan et al., 2014). The supply chain is a network of customers and suppliers (Heydari et al., 2007). The main goal of every supply chain is to maximize the total produced value (Choprs, Mindle, 2001). Analysis of factors influencing the supply chain of organizations in the industrial environment is one of the primary and major prerequisites for developing improvement programs. On the other hand, business enterprises have realized in the current competitive environment that they cannot manage to handle everything on their own. Supply chain management as one of the common issues of the last decades has caused major changes in the production sector of industrial countries (Daneshyan et al., 2014). Supply chain management is known as one of the infrastructural bases of business implementation in the world. Customers' demand for high quality and rapid services has led to the emergence of pressures that did not exist before. In the existing competitive market, economic enterprises and manufacturing companies find themselves in need of management and supervision of resources and pillars outside their organizations. Accordingly, activities such as product manufacturing and planning, inventory control, distribution, delivery, and serving customers are transferred to the supply chain level (Shahbandarzadeh, Peykam, 2012).

Supply chain management is a systematic analysis that covers the coordination and synchronization of the flow of resources in the network of suppliers, production facilities, distribution centers and customers. The components of this network play different roles in the supply chain. Hey receive raw materials from suppliers, turn the materials into end products in the manufacturing facilities and distribute the end product through distribution centers among customers (Alinezhad et al., 2014). Supply chain management aims to run the aforementioned process in a way that customers are enabled to receive reliable services or products at the lowest cost and quickly. Supply chain management is responsible for integration of

organizational units throughout the supply chain and coordination of the flows of materials, information and finances so as to meet the end customer's demand and improve supply chain competitiveness (Shahbandarzadeh, Peykam, 2012). With scientific and rational management of the chain of suppliers, as the important elements of strategic management, it is possible to obtain competitive advantage. In recent years, the emergence of new technologies and massive evolutions in the global markets has added to the necessity of supply chain management. As a result, different organizations have to use supply chain management to achieve and establish their competitive status. In this research it was tried to answer the following two questions: What factors influence supply chain performance? How significant are these factors? Considering the importance of supply chain management, in this research, which was based on the experiences in an industrial development, it was tried to understand the effect of supply chain management on management performance and rank the influencing factors.

THEORETICAL BACKGROUND

Supply Chain

The 1980s was the period of changes in the attitudes toward the role of purchase in organizational strategies. However, in the 1990s the researchers were focused on the integration and methods of recognizing purchase as a more important factor influencing organizational performance (Ellram, Carr, 1994). Porter (2002) in his great work on forces shaping industrial competition, introduces purchasers and suppliers as two of the force vital forces. According to Porter's model, when there are fewer purchasers in the business market the bargaining power of purchasers decreases. Therefore, suppliers shall increase quality and reduce costs. On the other hand, when there are fewer suppliers, the bargaining power of suppliers grows and they can determine the quality and price of products (Akdogan, Dwmirtas, 2014).

In this regard, every enterprise in the market competes with suppliers and purchasers for a higher profit margin. Bowersax et al. (2002) define a integrated supply chain as a multi-enterprise relationship management within the framework of capacity limitations, information, major competences, capital and human resources. In such circumstances, the supply chain structure and strategy lead to attempts to establish an operational link between the organization and its customers as well as between the organization and supply/distribution networks. These attempts are aimed at achievement of competitive advantage. Therefore, the entire organizational operation (from the purchase of raw materials to the delivery of products and services to the end customers) is integrated (Akdogan, Dwmirtas, 2014).

Supply chain is a chain that contains all of the activities associated with the flow of goods and conversion of raw materials (from the early preparation phase to the delivery of the end product to the consumer) (Javadian et al., 2012). The transmission not only includes the flow of materials but also covers the flow of information and finances (Houshmandi Maher et al., 2012). The ultimate goal of supply chain is to present products and services to the end customer by establishing connections and collaborations between different businesses. In this regard, capital, information, raw material, intermediate goods, and such determine the form of the collaboration between the businesses (Tabibi, Mazlumi, 2009). In other words, it could be stated that effectiveness and efficiency of every organization are the products of the management performance and structure of the supply chain of that organization (Rahmani Seresht, 2008).

Supply Chain Management

Traditionally, supply chain management (SCM) was the integrated and coordinated guidance of all of the supply chain members with an aim to improve the performance and increase the organization's profitability and interests. Supply chain managers also desired rapid delivery of goods and services, reduced costs and increased quality. However, this approach does not include the improvement of the green supply chain concept and the significance of social costs and environmental damages (Ansari, Sadeqi Moqadam, 2014). In the past two decades, supply chain management has been considered one of the key factors of competition and success of organizations and has drawn the attention of many researchers and experts at production and operation management (Choprs, Mindle, 2001). Supply chain management is focused on the integration of supply chain activities and information flows related to those activities by improving the chain relations. The ultimate goal of supply chain management is to achieve reliable and long-lasting competitive advantage. Hence, supply chain management is the process of integrating supply chain and the related information flows by improving and coordinating the production and distribution of products in the supply chain (Vaezi, Shahraki, 2011). Other definitions of supply chain are presented in the following.

- Supply chain management is the process of planning, implementing and controlling the supply chain operation and it is an effective method (which minimizes the costs) (Alinezhad et al., 2014).
- Cox (1999) defines supply chain as follows: First of all, it consists of processes that connect the customer to the supplier from the input of raw materials to the production of the end product. Secondly, it is a collection of tasks inside and outside the organization that activates the value chain for production and delivery of services to customers (Faraji Khorshidi, Hadadi, 2008).

- By quoting Hubner (2007), Estedler defiens supply chain as follows: Supply chain is a collection of organizations that are classified as upstream and downstream sectors. These sectors seek to create value for the end customer by providing a product or service and by running different activities and processes.
- By quoting Estedler, Hilletofth (2007) also defines supply chain as a collection of viewpoints that search for integration and effective collaborations between materials, information, and financial flows throughout the supply chain. As a result of the integration, the product is delivered to the required location timely, properly and at the lowest cost and thus the customer's need is met.
- It is an external chain of the entire chain of exchanges (including the source of raw materials to different companies) which is involved in the extraction and processing of raw materials, manufacturing, assembly, distribution and finally sales of the end product to the customer (Saunders, 1995).
- Supply chain is a network of distribution facilities and options and is responsible for preparing materials, converting the materials into intermediate and end products and delivering the end products to the customers. That is to say, it is a network of organizations involved in different processes and activities that create value for the end consumer through a set of products and services (Akdogan, Demirtas, 2014).

Supply Chain Performance Assessment

Performance assessment is an essential management tool which helps improve performance to increase supply chain efficiency. Although supply chain management is commonly practiced in the industries and numerous articles have been published about supply chain actions and theories, not much attention has been given to supply chain management (Chan et al., 2003). Performance assessment is vital to the success of every organization because it facilitates understanding behaviors, shaped behavior and improves competitiveness (Manian et al., 2010). Performance assessment can reveal important feedback information that enables managers to monitor the performance, expose progress levels, increase motives, improve communications, and identify problems (Waggoner et al., 1999). Performance assessment is an integral part of effective planning, control and decision making (Manian et al., 2010). Chan et al. (2003) identified six key processes (i.e. supplier, internal logistics, production, external logistics, marketing and sales, and final customers) and introduced inclusion, exclusion and mixed (combined) criteria for each process. They classified performance criteria into the groups of quantitative and qualitative criteria. Some of the examples of qualitative criteria include

customer satisfaction, flexibility, information flow integration, effective risk management, and supplier performance. Some of the quantitative criteria also include the following (Chan et al., 2003):

1) Cost-based criteria such as cost minimization, minimization investment in inventories, maximization of profit, and maximization of return on investment (ROI)
2) Customer-based criteria such as maximization of percentage of orders fulfillment (supply rate), minimization of product delivery delays, minimization of customer waiting time, minimization of LT (lead time: the interval between the reception and delivery of the order), and minimization of rework
3) Efficiency-based criteria such as maximization of utilization of capacity and harvest of resources

The goal of supply chain management is to improve supply chain process so as to deliver the product properly, timely and at lowest cost to the customer. The belief that supply chain management can improve responsiveness to customers and increase profits has drawn the attention of many managers to the notion of supply chain management (Husseini et al., 2010). Factors leading organizations toward supply chain management include the following: the need for improvement activities; increased outsourcing; increased transportation cost; increased competitive stress; increased globalization; significance of global commerce; supply chain complexity; and the need for inventory management (Ketchen, Giunipero, 2004).

Determining the Key Factors for Supply Chain Success

The objective of supply chain management is to ensure the product is delivered at the proper time and place as a result of optimization of the existing inventories (Heizer,Render, 2014; Slack et al, 2013). Inventory management (including raw materials, work in progress, and end products) can considerably influence the overall supply chain performance (Ballard, 1996; McCormack et al, 2012). Supply chain performance can be assessed based on a combination of factors using the Supply Chain Operations Reference model (SCOR) which is focused on internal values, customers and shareholders (Bolstorff,Rosenbaum, 2007). The SCOR model considers the general supply chain factors but it can be developed depending on the need for assessment (Guritno, 2013).

The key success factors are all of the tasks that when accomplished desirably assure a manager, an organization, and a supply chain of success. These factors represent that category of SCM (supply chain management) that call for special and continuous attention to improve performance. The studies of industries suggest that the key factors of success vary depending

on the industry (i.e. they vary from one level of the supply chain to other levels) (Muhammadi Zanjirani, 2007).

EMPIRICAL BACKGROUND

One of the new models of network economy is supply chain management which is a collection of methods for management and coordination of an entire chain (from suppliers to customers) (Gowen, William, 2003). From 1960 to 1970, companies had to improve the details of their marketing strategies which were based on the creation, capture and preservation of customers. They also had to participate in the management of a network of all of the preceding companies, who prepared the inputs (either directly or indirectly) and all of the subsequent companies (who were responsible for the delivery of products and after sales services). Hence, the notion of "supply chain" emerged (Soleymani Shiri, 2009).

In a study by Kazzazi et al. (2012) a new technique called "a method for measuring competitiveness (serving capacity) of supply chains" was proposed. This technique was designed on the basis of the teachings and indicators of the SCOR model. The six phases of this technique include the following: identification of factors influencing the competitiveness of supply chains using the fuzzy screening method; determining the relative importance (weight) of indicators selected in the first step using the fuzzy analytical hierarchy process; determining the fuzzy value of each of the indicators selected in the first step for the supply chains of the industry of concern; ranking supply chains of concern using the fuzzy TOPSIS method; finalizing the fuzzy values for the four main components of competitiveness; and drawing the measured competitiveness of each supply chain on a tetrahedron diagram (Kazzazi et al., 2012).

In 2011, Jafari et al. assessed the supply chain performance using the fuzzy analytical hierarchy method. They used the fuzzy decision-making method to prioritize the criteria and determine the significance of each criterion for the overall performance of the supply chain. They used five indicators (namely planning, supply of resources, production, delivery and performance) as the major criteria and finally a proper model and method was proposed for decision making and assessing the performance of an entire supply chain (Daneshyan et al., 2014). Aqajani and Dargahi (2012) carried out a study to assess and select suppliers for preparing a protective part for Iran Khodro Company. They localized the selected indicators and classified as 12 factors or assessment criteria. Next, using the analytical hierarchy process (AHP) they weighted the indicators and finally using the Vikor technique ranked the suppliers (Aqajani & Dargahi, 2012).

In their research, Ismaelian and Rabiyi (2007) introduced a fuzzy decision-making process for problems of selecting suppliers in supply chains. They considered the identification of the most suitable supplier to be a strategic factor in supply chains. They also considered many qualitative and quantitative performance criteria (such as quality, price, flexibility, and delivery time) to determine the most suitable supplier. The also used the Multi-Criteria Decision Making (MCDM) method in the fuzzy environment for selecting the suitable supplier. They used three methods for weight calculation and ranking of options with the fuzzy TOPSIS technique (Ismaelian, Rabiyi, 2007). A summary of other studies and their backgrounds are presented in Table (1).

Table (1): Previous research background

Previous research title	Time interval	Authors	Subjects	Results
An evidence approach to the assessment of supply chain performance (case study of the automobile industry)	2006	Daruish Mohammadi Zanjirani, Mohamad Modares Yazdi	Assessing supply chain management performance and studying different dimensions of supply chain management using the TOPSIS technique	Integrating the business performance of centers in a supply chain with their operational performance
Ranking suppliers based on indicators selected in the green supply chain of the dairy industry (case study of Sobh Sepid Company)	2010	Qasemdezh, Seyyed Java Iranian, Seyyed masoud Seyyedi	Ranking product and environmental criteria using the fuzzy AHP method	Proposing a model for ranking and assessing suppliers
Identification of factors influencing supply chain performance and its enhancement using the system dynamics method	2011	Nikbakhsh Javadian, Mahdi Khani, Iraj Mahdavi	Assessing and improving some undesirable behaviors in a supply chain using the system dynamics technique	The ability to predict before changing variables, connections or structure of the chain
Introducing a model for identification of factors influencing supply chain through a survey of new textbooks	2012	Hamid Shahbandarzadeh, Alireza Peykam	A total of 20 criteria and 210 subcriteria were studied using a new approach to new articles.	Competitiveness and sharing information with members of the supply chain (subcriterion) are considered the most important supply chain management criteria

Identifying and ranking factors influencing supply chain management using the multi-criteria decision making techniques	2012	Rahim Qasemieh, Shahla Yousefi Deh Bidi, Meysam Dastranj	Identifying factors influencing the improvement of supply chain and its refinement using the multi-criteria decision making method	Production, marketing, strategic relations and financial flows are the four factors having the highest effect on supply chain.
Ranking factors influencing sharing of information in the supply chain using the fuzzy multi-criteria decision making technique in the refinery and distribution of petroleum products industry of Iran	2014	Laya Olfat and Sima Sadiqi Gariz	Identifying factors influencing information sharing in supply chain using Excel, SPSS, and Matlab as well as the fuzzy ANP technique	Of the factors influencing sharing of information in the supply chain the responsiveness and commitment factors have the highest priority while interests of the supply chain members have the lowest priority.

Source: Author's compilation

In their research, Tseng and Chiu (2010) selected 18 criteria, including the following, for their study: environmental factors, environment management system, supplier efficiency, and close relationships with supplier. They used the fuzzy theory to turn linguistic criteria to final numbers (Tseng, Chiu, 2010).

Elbaz (2011) used a model for assessment of supply chain performance to study the effects of qualitative and quantitative factors on company performances. He used a combination of fuzzy theories and AHP in his research and successfully applied it to a production company.

Chen et al. (2006) used the fuzzy TOPSIS approach to select a supplier from a supply chain (Chen, 2006). In a study in 2010 by Chen Lee et al., the TOPSIS method was used to rank a suitable strategy. In this research, the analytical network process (ANP) was used to calculate the input weights (Karbasian et al., 2012). Leen et al. used an enterprise resource planning (ERP) to conduct a case study of the electronics industry. In this integrated model, the ANP and Topsis techniques were employed to calculate and rank the suppliers. The model for minimization of lead time (LT) effectively allocates an order volume to each seller (Sailin, 2011).

Peter Turkman et al. (2010) examined the relationship of the design analytical potentials, resources, production and delivery in the supply chain with performance of the decision support systems. The structural equation of the model was used for a sample containing 310 companies operating in different industries in America, Europe, Canada, Brazil and China. The findings revealed an evident relationship between analysis potentials and performance.

Table (2) presents a summary of the research background of indicators of supply chain management under study.

Table (2): Supply chain management research background

Author	Supply chain management indicator	Number of indicators per research
John T Mentzer et al, 2006	Demand management – knowledge management – overall environment identification – marketing and sales management – production management – operations management – supply chain innovation – supply chain security – supply chain recognition – distribution management – integrated logistics management – inventory management – transportation management – storage management – supply management – financial management – risk management – news and information interpretation systems – customer services and value management – communication management – supply chain control.	21
Xinyan Song et al, 2009	Resources (total supply chain management costs – distribution costs – inventory costs – production costs – inventory turnover costs – information management costs – warranty costs – new product flexibility – information systems flexibility) – information (information accuracy – timeliness of information – availability of information – information sharing – added value – employee efficiency – return on investment) - output (profit – lost sales – filling rate – delivering orders on time – percentage of timely delivery – fulfillment of orders – customer satisfaction – planning time cycle – fund to fund time cycle) – flexibility (supply chain responsiveness – production flexibility – procurement and purchasing flexibility – logistics flexibility – delivery flexibility) – innovation (rate of sales and introduction of new products –supply chain stability)	31
Martin Fischer et al,2010	Saving time – balance between demand and supply – demand information complexity	3
Wan Hasrulnizzam,et al,2009	Customers – prediction – suppliers – positioning – logistics – design – capacity planning – processing –inventory – purchase	10
Kanji Gopal et al,1999	Long term relationship (information sharing – high quality customer services – involving suppliers – integrated logistic processes) – top business (customer satisfaction – business results – involving suppliers – supplier satisfaction) – leadership (cooperation culture – commitment to relations – commitment to quality) – focusing on customers (commitment to customer satisfaction) – participation (suppliers dynamicity – cooperative goals – cooperative debate) – reality-based management (integrated structure, performance measurement – information exchange) – continuous improvement (process improvement – planning and prevention)	20

Kurd & Golshahi (2013)	Management and organization (establishing a system for managing the salaries and efficiency of employees – commitment of the management and organization – training expert human forces- effectiveness of the organizational chart – aligning with organization goals – organization's culture development) – ordering and delivery (developing mechanisms for the reception of orders and delivery of products – addressing obstacles in the customer communication channels for ordering and delivery – internet sales) – cost and price (flotation of prices based on the final cost – government limitations – access to supply resources at lower costs – enabling cost and profit analysis – solutions for final price of products) – market share (proper interactions with customers – mechanisms for identification of domestic and foreign markets- product diversity strategy – studying and recognizing rivals and their shares – aligning with different market tastes – mechanized marketing) – responsiveness (developing mechanisms for the feedback system – establishing responsiveness reinforcement systems – training the personnel to improve their competency) – outsourcing (developing the outsourcing culture – identification and classification of activities – access to appropriate contracting companies – estimating costs and interests resulted from outsourcing – contractors assessment mechanisms) – information technology (feasibility study of the company for using IT in different areas – creating a customer portal – upgrading network equipment – teaching the use of IT – developing information technology platforms)	35
Khan Rai Waqas Azfar et al, 2014	Operational performance (inventory level – quality- time- customer satisfaction) – economic performance (cost – environmental costs – cash cycle) – environmental performance (business wastes)	6
Shahbandarzadeh & Peykam (2012)	Competitiveness – supplier – partners – organization – coordination – purchase and order – logistics – financial management – planning – information technology (IT) – production and implementation - customer	12

Source: Author's compilation

Generally, the philosophy of supply chain management is that the overall performance of a collection of supply chains is increased when the performance of all of the organizations associated with the process is optimized in relation to the performance of each individual organization. Supply and demand planning and management, preparation of raw materials and schedules for products or services, warehousing, inventory control, distribution, delivery, and serving customers are among the components arranged through supply chain management. The objective of this coordination and arrangement is to enable customers to obtain high-quality

products and reliable services at lowest costs. These achievements can, in turn, create competitive advantage for the company (Breen, Crawford, 2005).

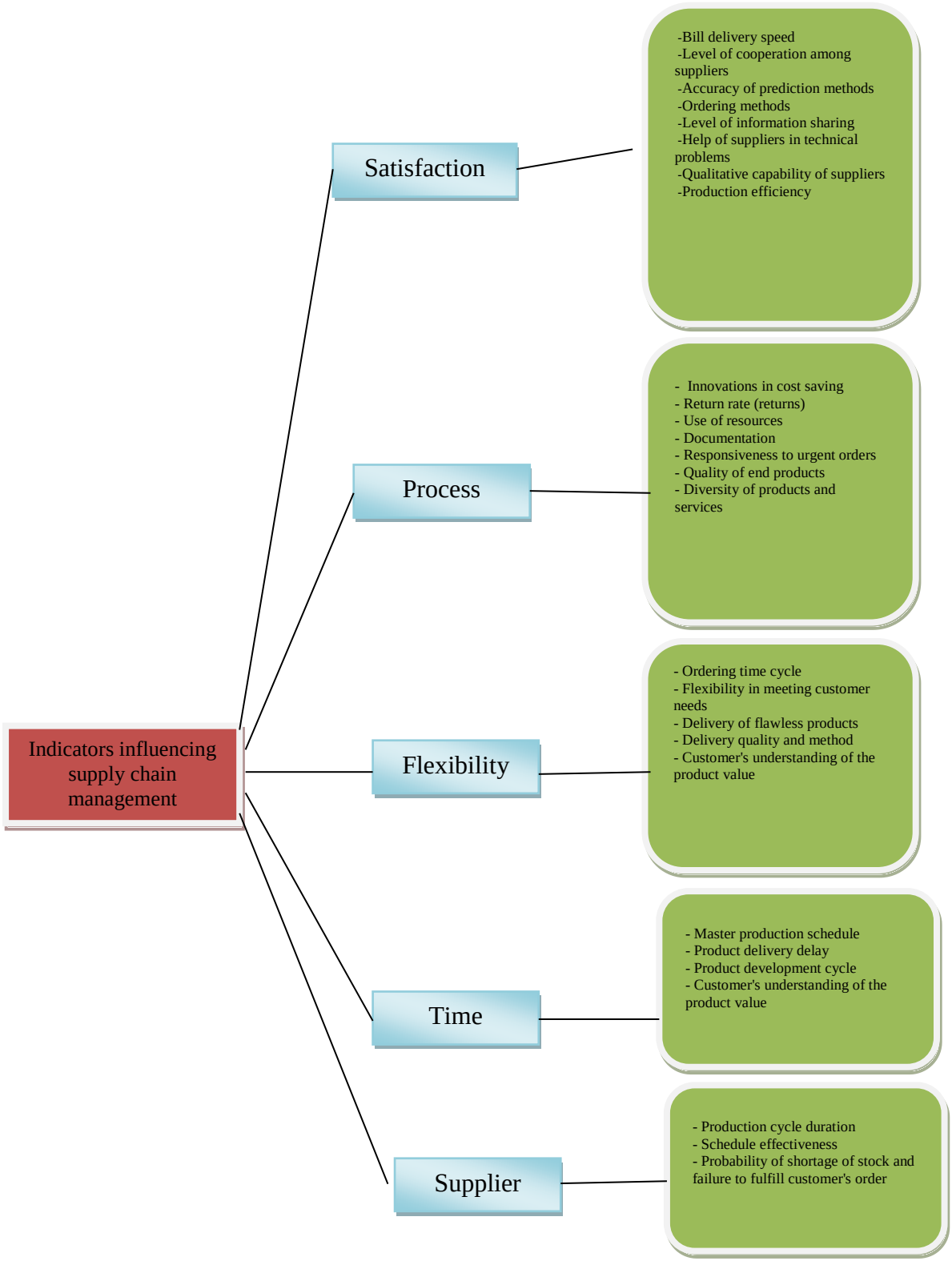
The notion of supply chain has been explored by many researchers so far. Some researchers consider it to be a synonym for notions such as logistics, operation management, supplies, or a combination of the three notions (Kazzazi & Sohrabi, 2010). However, it is possible to rely on the following inclusive definition which was presented by the global supply chain association: “supply chain management is the integration of key business processes from the final user to the main supplier, who is responsible for supplying products, services, and information that create added value for the customers and stakeholders of the organization.”

In recent years, many organizations have accepted the Supply Chain Operations Reference (SCOR) as a powerful and inclusive instrument for analysis and improvement of supply chains. This model is based on the major supply chain processes such as sourcing, manufacturing and distribution (Kazzazi, Sohrabi, 2010).

CONCEPTUAL MODEL

A review of the research literature was carried out to be able to assess the indicators with more precision. Moreover, in response to the first research question about the factors and indicators influencing supply chain management, the research conceptual model is depicted using 5 criteria and 27 indicators in Figure (1). Next, based on the opinions of 12 experts and using methods explained in the relevant section, the weight of each factor was determined in accordance with the pair-wise comparison questionnaires using Chang’s triangular fuzzy analytical hierarchy process.

Figure (1): Research conceptual model



RESEARCH METHODOLOGY

This study was carried out to find a solution to increase production of industrial organizations by improving the supply chain performance. The present research is an applied study regarding its objective and is a descriptive-survey study regarding its data collection method. This study was an attempt to identify factors influencing supply chain management and to rank the results factors. In this research, it was tried to identify factors influencing the supply chain performance of industries (in Shokouhieh industrial development, Iran) and to rank the factors based on their influence.

The structural equations analysis for this research was carried out using the Smart-PLS statistical analysis software and SPSS. The second study population was composed of the experts from the first population. Members of the second population were selected using the snowball sampling method. The members of this population were graduates of disciplines related to industrial management and supply chain. They also had the knowledge and experience of supply chains. A total of 12 participants, who completed the second (pair-wise comparison) questionnaire, were selected using the mentioned sampling method. This questionnaire includes linguistic words and fuzzy values. The data was analyzed using Chang's triangular fuzzy analytical hierarchy process in Excel.

EMPIRICAL FINDINGS

The result of Bartlett's test, which is an approximation of the Chi-square statistic, is shown in Table (3). The significance for Bartlett's test is smaller than 0.05, which indicates that factor analysis is useful for identification of the structure of the factor model. In addition, the value of the KMO index (which is equal to 0.753) suggests that the sample size is adequate for the exploratory factor analysis. In the end, 27 variables or questions of the questionnaire are classified into 5 groups of indicators or criteria through exploratory factor analysis.

Table (3): Exploratory factor analysis

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.753
Bartlett's Test of Sphericity	Approx. Chi-Square	1051.67
	df	351
	Sig.	.000

Based on the results of the exploratory factor analysis, 6 factors were identified from the 27 variables of the questionnaire as the main factors. The variables with the maximum correlation

with each factor are classified in the group of that factor. Hence, 27 research variables were classified and the sixth factor was omitted due to the existence of one question.

Confirmatory Factor Analysis

It is a comprehensive method used for selecting the type of the measuring models in the research conceptual model. In the confirmatory factor analysis, the standardized coefficients and significance coefficients (t-Student test) for the questionnaire were obtained for each factor (Table 4).

Table (4): A summary of the results of the confirmatory factor analysis

Factor	Component	Factor load	Significance coefficient
Satisfaction A1	Bill delivery speed	0.819	16.687
	Level of cooperation between suppliers	0.807	16.058
	Accuracy of the prediction methods	0.634	4.921
	Ordering methods	0.786	14.293
	Level of shared information	0.768	15.687
	Help of suppliers in technical problems	0.810	17.679
	Qualitative competence of the supplier	0.860	25.042
	Production efficiency	0.724	12.206
Process A2	Innovations in cost saving	0.677	17.180
	Return rate (returns)	0.657	26.206
	Documentation	0.806	21.657
	Use of resources	0.865	11.909
	Responsiveness to urgent orders	0.830	7.290
	Quality of the end product	0.781	8.205
	Diversity of products and services	0.710	6.891
Flexibility A3	Duration of ordering cycle	0.622	16.087
	Flexibility in meeting customer needs	0.844	24.864
	Rate of delivery of flawless products	0.862	15.726
	Delivery quality and method	0.833	12.378
	Customer's understanding of the product value	0.766	6.619
Time A4	Master production schedule	0.774	12.243
	Delay in product delivery	0.759	9.566
	Product development cycle duration	0.724	9.919
	Delay in minimizing the lead time	0.844	23.789

	End product cycle duration	0.822	13.135
Supplier	Effectiveness of product distribution timing	0.792	7.015
A5	Costs incurred by lack of stock	0.692	15.878

Table (5) shows the Cronbach's alpha and composite reliability of the research variables. For each 5 variables, the Cronbach's alpha is higher than 0.7 which reflects the proper reliability of the model.

Table (5): Reliability

	Composite reliability	**Cronbach's alpha**
A1	0.924	0.906
A2	0.907	0.879
A3	0.891	0.846
A4	0.858	0.783
A5	0.813	0.764

Prioritizing the Factors Using the Fuzzy Analytical Hierarchy Process

Since the number of experts in this method is 12, there are 12 different matrixes for each factor. In the fuzzy analytical hierarchy process first the 12 matrixes are transformed into one matrix. One of the best ways to combine the tables for pair-wise comparisons of all of the respondents is to use the geometric mean method. Assuming that $\tilde{a}_{ij}^{k}$ is the element associated with the K-th respondent in the comparison between the i and j criteria, the geometric mean for the corresponding elements is calculated using the following relation:

(1) $\tilde{a}_{ij} = \left(\prod_{k=1}^{n} \tilde{a}_{ij}^{k}\right)^{\frac{1}{n}}$

(2) $\tilde{a}_{ij} = (\tilde{a}_{ij}^{1} \otimes \tilde{a}_{ij}^{2} \otimes \ldots \otimes \tilde{a}_{ij}^{12})^{\frac{1}{12}}$

Based on the result of the exploratory factor analysis, 6 factors are identified as the major factors for 27 variables of the questionnaire. Using formula 2, the pair-wise comparison matrixes for the 12 experts is transformed into five matrixes for the sub-factors and one pair-wise comparison matrix for the factors. Table (6) presents the geometric means for the expert opinions on factors influencing supply chain. Using this table and Chang's method, the final weights of factors influencing the supply chain are calculated.

Table (6): Fuzzy matrix for the pair-wise comparisons between factors influencing supply chain

	Satisfaction (1)			Process (2)			Flexibility (3)			Time (4)			Supplier (5)		
Satisfaction	1.000	1.000	1.000	1.687	1.780	1.857	2.485	2.675	2.787	2.687	2.875	2.932	2.595	2.711	2.864
Process	0.539	0.562	0.593	1.000	1.000	1.000	1.589	1.654	1.723	2.323	2.430	2.501	1.432	1.434	1.504
Flexibility	0.359	0.374	0.402	0.580	0.605	0.629	1.000	1.000	1.000	0.612	0.875	0.912	1.386	1.453	1.499
Time	0.341	0.348	0.372	0.400	0.412	0.430	1.096	1.143	1.634	1.000	1.000	1.000	0.612	0.854	0.907
Supplier	0.349	0.369	0.385	0.665	0.697	0.698	0.667	0.688	0.722	1.103	1.171	1.634	1.000	1.000	1.000

Based on the expert opinions on the significance of factors influencing the supply chain, the final normal and non-normal weights of each factor were calculated (Table 7).

Table (7): Final weight of factors influencing supply chain

Factors influencing supply chain	Non-normal weight	Normal weight
Satisfaction	1	0.24001
Process	0.86843723	0.208434
Flexibility	0.77632571	0.186326
Time	0.75805131	0.18194
Supplier	0.76367103	0.183289
Sum	4.16648529	1

Based on the resulting weights, the priority of factors influencing supply chain is as follows: satisfaction, process, flexibility, supplier and time. In the following, the table for the geometric means of expert opinions on the sub-components of every factor influencing the supply chain is shown along with the table for the final weight of each component.

Table (8): The fuzzy matrix for the pair-wise comparisons of the sub-components of satisfaction

First component: satisfaction	Bill delivery speed (11)			Level of cooperation of suppliers (12)			Accuracy of prediction method (13)			Ordering methods (14)			Level of shared information (15)			The help of suppliers in solving technical problems (16)			Supplier's qualitative competence (17)			Production efficiency (18)		
Bill delivery speed	1.000	1.000	1.000	0.610	0.700	0.750	0.720	0.760	0.800	1.410	1.460	1.520	0.480	0.510	0.530	1.960	2.050	2.140	0.710	0.920	1.140	0.456	0.471	0.495
Level of suppliers cooperation	1.333	1.429	1.639	1.000	1.000	1.000	1.220	1.280	1.340	1.590	1.670	1.690	0.740	0.790	0.840	2.410	2.470	2.530	1.310	1.490	1.690	1.326	1.366	1.447
Accuracy of prediction methods	1.250	1.316	1.389	0.746	0.781	0.820	1.000	1.000	1.000	2.010	2.100	2.130	0.560	0.620	0.700	2.560	2.630	2.710	1.220	1.430	1.520	0.418	0.431	0.450
Ordering methods	0.658	0.685	0.709	0.592	0.599	0.629	0.469	0.476	0.498	1.000	1.000	1.000	0.420	0.510	0.600	0.980	1.030	1.120	0.620	0.660	0.770	0.451	0.494	0.536
Level of shared information	1.887	1.961	2.083	1.190	1.266	1.351	1.429	1.613	1.786	1.667	1.961	2.381	1.000	1.000	1.000	2.370	2.420	2.490	1.600	1.780	1.980	0.402	0.431	0.450
The help of suppliers in solving technical problems	0.467	0.488	0.510	0.395	0.405	0.415	0.369	0.380	0.391	0.893	0.971	1.020	0.402	0.413	0.422	1.000	1.000	1.000	0.520	0.570	0.650	0.596	0.648	0.695
Supplier's qualitative competence	0.877	1.087	1.408	0.592	0.671	0.763	0.658	0.699	0.820	1.299	1.515	1.613	0.505	0.562	0.625	1.538	1.754	1.923	1.000	1.000	1.000	0.715	0.810	0.898
Production efficiency	2.020	2.124	2.194	0.691	0.732	0.754	2.221	2.321	2.394	1.867	2.023	2.218	2.223	2.321	2.485	1.439	1.543	1.679	1.113	1.234	1.399	1.000	1.000	1.000

Table (9): Final weight of sub-components of satisfaction

Satisfaction sub-components	Non-normal weight	Normal weight
Bill delivery speed	0.92649167	0.122567
Suppliers cooperation level	0.975575172	0.12906
Accuracy of prediction methods	0.959500568	0.126933
Ordering methods	0.893760548	0.118237
Level of shared information	0.988258901	0.130738
The help of suppliers in solving technical problems	0.885916096	0.117199
Supplier's qualitative competence	0.92958382	0.122976
Production efficiency	1	0.132291
Sum	7.559086776	1

Table (10): Final weight of sub-components of the process factor

Second component: process	Innovations in cost saving (8)			Return rate (returns) (9)			Documentation (19)			Use of resources (20)			Responsiveness to urgent orders (24)			End product quality (25)			Diversity of products and services (26)		
Innovations in cost saving	1.000	1.000	1.000	0.980	1.120	1.220	0.510	0.580	0.620	1.260	1.450	1.630	0.580	0.640	0.720	1.240	1.350	1.430	0.830	0.910	1.030
Return rate (returns)	0.820	0.893	1.020	1.000	1.000	1.000	0.680	0.790	0.870	0.930	1.000	1.040	0.720	0.800	0.930	1.290	1.400	1.540	0.770	0.850	0.960
Documentation	1.613	1.724	1.961	1.149	1.266	1.471	1.000	1.000	1.000	1.830	2.000	2.210	1.010	1.070	1.120	2.010	2.160	2.420	1.450	1.570	1.680
Use of resources	0.613	0.690	0.794	0.962	1.000	1.075	0.452	0.500	0.546	1.000	1.000	1.000	0.680	0.750	0.830	0.990	1.100	1.210	0.810	0.900	1.030
Responsiveness to urgent orders	1.389	1.563	1.724	1.075	1.250	1.389	0.893	0.935	0.990	1.205	1.333	1.471	1.000	1.000	1.000	1.920	2.080	2.270	1.360	1.430	1.540
End product quality	0.699	0.741	0.806	0.649	0.714	0.775	0.413	0.463	0.498	0.826	0.909	1.010	0.441	0.481	0.521	1.000	1.000	1.000	0.730	0.790	0.860
Diversity of products and services	0.971	1.099	1.205	1.042	1.176	1.299	0.595	0.637	0.690	0.971	1.111	1.235	0.649	0.699	0.735	1.163	1.266	1.370	1.000	1.000	1.000

Table (11): Final weights of process sub-components

Process sub-components	Non-normal weight	Final weight
Innovations in cost saving	0.9283385	0.141671
Return rate (returns)	0.9222618	0.140744
Documentation	1	0.152607
Use of resources	0.9070632	0.138424
Responsiveness to urgent orders	0.9770154	0.1491
End product quality	0.8909333	0.135963
Diversity of products and services	0.9271611	0.141491
Sum	6.5527733	1

Table (12): The pair-wise comparison fuzzy matrix for the sub-components of flexibility

Third component: flexibility	ordering cycle duration (6)			Flexibility in meeting customer needs (21)			Rate of delivery of flawless products (22)			Delivery quality and method (23)			Customer's understanding of product value (27)		
Ordering cycle duration	1.000	1.000	1.000	1.530	1.600	1.690	0.550	0.580	0.670	1.456	1.574	1.687	0.970	1.020	1.080
Flexibility in meeting customer needs	0.592	0.625	0.654	1.000	1.000	1.000	0.700	0.740	0.790	1.345	1.431	1.564	1.080	1.140	1.210
Rate of delivery of flawless products	1.493	1.724	1.818	1.266	1.351	1.429	1.000	1.000	1.000	0.754	0.888	0.932	0.897	0.964	1.054
Delivery quality and method	0.593	0.635	0.687	0.639	0.699	0.743	1.320	1.540	1.840	1.000	1.000	1.000	0.897	1.021	1.132
Customer's understanding of product value	0.926	0.980	1.031	0.826	0.877	0.926	0.949	1.037	1.115	0.883	0.979	1.115	1.000	1.000	1.000

Table (13): Final weights of subcomponents of flexibility

Flexibility sub-components	Non-normal weight	Normal weight
Ordering cycle duration	0.99418755	0.203824
Flexibility in meeting customer needs	0.96245352	0.197318
Rate of delivery of flawless products	1	0.205016
Delivery quality and method	0.96090606	0.197001
Customer's understanding of product value	0.96011935	0.19684
Sum	4.87766648	1

Table (14): The pair-wise fuzzy matrix for subcomponents of time

Fourth factor: Time	Master production schedule (2)			Delivery delay (3)			Product development cycle duration (4)			Delay in minimization of lead time (7)		
Master production schedule	1.000	1.000	1.000	1.230	1.360	1.430	1.010	1.100	1.140	0.670	0.790	0.880
Delivery delay	0.699	0.735	0.813	1.000	1.000	1.000	0.980	1.000	1.040	0.660	0.740	0.810
Product development cycle duration	0.877	0.909	0.990	0.962	1.000	1.020	1.000	1.000	1.000	0.620	0.670	0.720
Delivery in minimization of lead time	1.136	1.266	1.493	1.235	1.351	1.515	1.389	1.493	1.613	1.000	1.000	1.000

Table (15): Final weights of time subcomponents

Time subcomponents	Non-normal weight	Final weight
Master production schedule	0.94762359	0.252377
Delivery delay	0.90042599	0.239807
Product development cycle duration	0.90674963	0.241491
Delay in minimization of lead time	1	0.266326
Sum	3.75479922	1

Table (16): The pair-wise comparison fuzzy matrix for the subcomponents of supplier

Fifth factor: supplier	Production cycle duration (1)			Schedule effectiveness (5)			Probability of shortage of stock and failure to fulfill customer order (10)		
Production cycle duration	1.000	1.000	1.000	0.480	0.530	0.610	0.770	0.800	0.850
Schedule effectiveness	1.639	1.887	2.083	1.000	1.000	1.000	1.470	1.590	1.630
Probability of stock and failure to fulfill customer order	1.176	1.250	1.299	0.613	0.629	0.680	1.000	1.000	1.000

Table (17): Final weights of the subcomponents of supplier

Supplier subcomponents	Non-normal weight	Final weight
Production cycle duration	0.77835497	0.297834
Schedule effectiveness	1	0.382646
Probability of shortage of stock and failure to fulfill customer order	0.83502919	0.31952
Sum	2.61338415	1

The following table shows the weights of all of the components influencing the supply chain as well as the priority of each component in relation to others. The weights are obtained by multiplying the weight of each component by the weight of its corresponding factor. As seen in Table (18), the following components are the most important components influencing the supply chain and thus shall be valued more: schedule effectiveness, probability of shortage of stock and failure to fulfill customer order, production cycle duration, delay in minimization of lead time, and master production schedule. However, among all of the factors influencing the supply chain include satisfaction and process, which call for more attention. Therefore, the answer to the second research question is shown in the following table.

Table (18): Weights of all of the components influencing the supply chain

Component number	Components	Factor	Total weight	Priority
1	Production cycle duration (0.297834)	Supplier (0.1383289)	0.054589696	3
2	Master production schedule (0.252377)	Time (0.18194)	0.045917471	5
3	Delay in product delivery (0.239807)	Time (0.18194)	0.043630486	7
4	Product development cycle duration (0.241491)	Time (0.18194)	0.043936873	6
5	Schedule effectiveness (0.382646)	Supplier(0.1383289)	0.070134803	1
6	Ordering cycle duration (0.203824)	Flexibility (0.186326)	0.037977711	9
7	Delay in minimization of lead time (0.266326)	Time (0.18194)	0.048455352	4
8	Innovations in cost saving (0.141671)	Process (0.208434)	0.029529053	19
9	Return rate (returns) (0.140744)	Process(0.208434)	0.029335835	23
10	Probability of shortage of stock and failure to fulfill customer order (0.31952)	Supplier(0.1383289)	0.058564501	2
11	Bill delivery speed (0.122567)	Satisfaction(0.24001)	0.029417306	22
12	Level of suppliers cooperation (0.12906)	Satisfaction (0.24001)	0.030975691	17
13	Accuracy of prediction methods (0.126933)	Satisfaction(0.24001)	0.030465189	18

14	Ordering methods (0.118237)	Satisfaction(0.24001)	0.028378062	25
15	Level of shared information (0.130738)	Satisfaction(0.24001)	0.031378427	15
16	The help of suppliers in technical problems (0.117199)	Satisfaction(0.24001)	0.028128932	27
17	Supplier's qualitative competence (0.122976)	Satisfaction(0.24001)	0.02951547	20
18	Production efficiency (0.132291)	Satisfaction(0.24001)	0.031751163	14
19	Documentation (0.152607)	Process (0.208434)	0.031808487	13
20	Use of resources (0.138424)	Process(0.208434)	0.028852268	24
21	Flexibility in meeting customer needs(0.197318)	Flexibility(0.186326)	0.036765474	10
22	Rate of delivery of flawless products (0.205016)	Flexibility(0.186326)	0.038199811	8
23	Delivery quality and method (0.197001)	Flexibility(0.186326)	0.036706408	11
24	Responsiveness to urgent orders (0.1491)	Process(0.208434)	0.031077509	16
25	End product quality (0.135963)	Process (0.208434)	0.028339312	26
26	Diversity of products and services(0.141491)	Process(0.208434)	0.029491535	21
27	Customer's understanding of product value (0.19684)	Flexibility (0.186326)	0.03667641	12

INTERPRETATION OF RESULTS AND CONCLUSION

The requisite for the success of any business is effective supply chain management. The requisite for effective supply chain management is also to identify factors influencing the chain and prioritize the factors to achieve continuous improvement. Based on the numerous previous studies in scientific fields as well as the practical experiences with supply chain management, identification of factors influencing supply chain performance has been addressed from different viewpoints using various models. Proper supply chain performance plays a significant role in the success of every organization that is seeking to increase its production. Identification and ranking of factors influencing the supply chain contributes to the identification of the significance of each indicator. The final goal of this process is to provide a product with higher quality and lower price by standardizing and improving the internal processes.

Answer to the first question: "What factors influence the performance of supply chains?"

In this study, by identifying factors influencing supply chain management using the Chan et al. model and opinions of experts working in Shokouhieh industrial development (which were selected randomly from 5 companies), the following 27 indicators and identified and extracted: bill delivery speed; level of suppliers' cooperation; accuracy of prediction methods; ordering method; level of shared information; the suppliers' help in solving technical problems; supplier's

qualitative competence; production efficiency; innovations in cost saving; return rate; use of resources; documentation; responsiveness to urgent orders; end product quality; diversity of products and services; order cycle duration; flexibility in meeting customer needs; rate of delivery of flawless products; delivery quality and method; customer's understanding of product value; master production schedule; delay in delivery; product development cycle duration; customer's understanding of product value; production cycle duration; schedule effectiveness; probability of shortage of stock or failure to fulfill customer orders.

Based on the exploratory factor analysis model, the above 27 indicators were classified into 5 criterion groups. Next, results of the exploratory factor analysis were confirmed through a confirmatory factor analysis. The 5 criteria included flexibility, process, satisfaction, time and supplier.

Answer to the second question: "How significant are the factors influencing the supply chain?" Using the pair-wise comparison matrixes, the geometric means of opinions on different factors influencing the supply chain were calculated. The matrix was used using Chang's method to obtain the final weights of factors influencing the supply chain. According to the resulting weights, the factors influencing the supply chain are prioritized in the following order: satisfaction, process, flexibility, supplier, and time. Moreover, the weight of each subcomponent of the factors influencing the supply chain was also calculated.

In the end, the weights of all of the components influencing the supply chain along with the priority of the components were determined. The weights were calculated by multiplying the weight of each component by the weight of its corresponding factor. The most important components influencing the supply chain included schedule effectiveness, probability of shortage of stock and failure to fulfill customer's order, production cycle duration, delay in minimization of lead time, and master production schedule. Therefore, these components required more attention. However, among all of the factors influencing the supply chain, satisfaction and process were the most important and require more attention. Hence, by identifying and prioritizing supply chain indicators it is possible to improve supply chain performance and increase production in industrial organizations.

Therefore, among the other factors the following factors are specifically significant: the supply chain's ability to win the satisfaction and loyalty of customers regarding prediction methods, ordering methods, qualitative competence and efficiency (satisfaction criterion); and the function and flow of activities along the supply chain (including turnover, materials and information as the criteria of process) regarding cost-saving innovations, diversity of products and services, responsiveness, etc. In sum, it can be concluded that the study of factors

influencing the supply chain is necessary in every industry. This is because it not only leads to the identification of the strengths of the contributing factors and indicators (i.e. which have top priorities), but also provides for the identification of weaknesses or factors and indicators that are less significant in supply chains. The results of this process can ultimately contribute to the continuous supervision, increased production, coordination, and development and preservation of companies' competitive advantage.

RESEARCH LIMITATIONS

Research limitations those factors standing in the way of data collection and hampers the desired results .They are always limited in its investigation that some are even beginning to show itself .

Of the main pillars of research is access to statistics and data. In this context, there are problems that made research services such as access to books, magazines, statistics, databases, etc. in the country simply is not possible. Part of the problem stems from the lack of a culture of research services above and the other wrong, because these cases are considered private and therefore their findings to other individuals and institutions refuse to kind of transfer. The unwanted variables that may be the result of special projects and methods that are used in research, often in different species, jeopardize the reliability of internal and external research. Should be aware that in the Behavioral Sciences Research, control or total elimination of these factors is impossible. However, researchers have found that these factors as much as possible to anticipate, identify and apply all possible precautions to reduce them.

REFERENCES

Akdogan ,A.Asuman,Demirtas,(2014),"Managerial Role in Strategic Supply Chain Management ",Procedia- Social ang Behavioral Science 150,PP.1020-1029.

Alinezhad, Alireza, Shahriyari, Zahra, & Rahmati, Seyyed Habibullah (2014). Multi-facility positioning in a supply chain under fuzzy conditions. Industrial Management, no. 35, pp. 151-178.

Ansari, Iman, Sadeqi Muqadam, Muhammadreza (2014). Identifying, determining the relationships and prioritizing green supply chain management motives using the structural interpretive modeling approach. Industrial Management, no. 35, pp. 123-150.

Aqajani, Hassanali & Dargahi, Hadi (2012). Assessing supply chain suppliers using a combined approach resulted from multi-criteria decision making techniques in the fuzzy environment. Third national conference of industrial and systems engineering.

Ballard, R.L. (1996). Methods of Inventory Monitoring and Measurement. Journal of Logistics Information Management Vol. 9 No. 3, pp. 11-18.

Bimal Nepal, Om P. Yadav, Alper Murat (2010) "A fuzzy-AHP approach to prioritization of CS attributes in target planning for automotive product development" , Expert Systems with Applications, 37(10),PP. 6775-6786.

Bolstorff, P. and R. Rosenbaum.) 2007(. Supply Chain Excellence: A Handbook for Dramatic Improvement Using the SCOR Model. Amacom : NewYork.

Breen, L. and Crawford, H. (2005). Improving the pharmaceutical supply chain. International Journal of Quality & Reliability Management, Vol. 22, No. 6, pp.572-591.

Chan, T. S. Qi, H. J. Chan, H. K, Lau. C. W, & Li, W. L. (2003). A conceptual model of performance measurement for supply chains. Management Decision,pp. 635-642.

Chen C-T, Lin C-T, Huang S-F. (2006). A fuzzy approach for supplier evaluation and selection in supply chain management, "International Journal of Production Economic", 102, pp. 289–301.

Chopra, S., Meindl P. (2001). Supply Chain Management: Strategy, Planning, and Operations, 3rd Edition, Prentice-Hall, Inc.Hall,Upper Saddle River,New Jersey.

DeBoer, L. Labro E; Morlacchi P.,(2001),"A review of methods supporting supplier selection",European Journal oF Purchasing & Supply Management;Vol.7.

Dehqani Kazemi, Vahed, Jafari, Hamidreza Salehi, Ismail, & Yeganehkia, Zeynab (2012). Application of multi-criteria decision making techniques and fuzzy logic to the selection of the optimal method for disposal of Tehran City wastes. Second conference on planning and environment management.

Elbaz.M (2011)."Fuzzy performance measurement of supply chain in manufacturing companies, Expert Systems with Applications", Expert Systems with Applications, Vol 38, Issue 6, June 2011, PP.6681-6688.

Ellram, L.M. and Carr, A. (1994), "Strategic purchasing: A history and review of the literature", International Journal of Purchasing and Material Management, 30, 2, 10-18.

Faraji Khorshidi, Hujjat Haddadi, Seyyed Mustafa (2008). Assessing the supply chain of pharmaceutical air rings in Iran: case study of Social Security Organization. Management Thoughts, no. 1, pp. 75-102.

Fischer, M., Law, K& Lee, H,.(2010). Real-Time Supply Chain Management (SCM) using Virtual Design and Construction (VDC) and Lean., s.l. : CIFE, Stanford University.

Ganesh, K., Narendran, T.T. and Anbuudayasankar, S.P, (2014) "Evolving cost-effective routing of vehicles for blood bank logistics", International Journal of Logistics Systems and Management, Vol. 17, No. 4, pp. 381-415.

Gopal, K., & Wong, A.(1999), Business Excellence model for supply chain management. , s.l. : Total Quality Management, Vol. 10,PP.1147-1168.

Gowen, Charles R. Tallon, and William J. (2003). Enhancing supply chain practices through human resource management, Journal of Management Development, Vol. 22 No. 1, pp. 32-44.

Guritno, A.D. (2013). Development of supply chain risk management of fresh vegetables. Proceeding of Food Innovation Asia Conference 2013: Empowering SMEs through science and technology. Bangkok, Thailand.

Hasrulnizzam. W., Mahmood. W., & Muhamad. M.,s.l.(2009) , Supply Chain Management:After Business Process Re-Engineering.: World Academy of Science, Engineering and Technology,pp.53.

Heizer, J, and B. Render. (2014). Operations Management. John Wiley and Sons. Singapore.

Heydari, Jafar, Kazemzadeh brothers, and Chaharsouqi, Kamal (2007). Analyzing the effects of variations of delivery times on supply chain performance. fifth international conference on industrial engineering, Iran University of Science and Technology.

Houshmand, Maher, Majid, Amiri, Maqsud, Olfat, La'aya (2012). Integrated model of supplier selection in supply chains: Information technology potentials approach. Industrial management perspective, no. 8, pp. 91-115.

Hubner, R. (2007). "Strategic supply chain management in process industry". notes in economics and mathematical systems.

Husseini, Seyyed Mahmoud, Muhammadi, Amirsalar, & Pishvayi, Mirsaman (2010). The supply chain strategy and selection of production organization. Strategic management studies, no. 2, pp. 89-112.

Ismaelian, Majid and Rabiyeh Masoud (2007). Assessment and selection of suppliers using fuzzy TOPSIS and fractional planning. Fifth national conference on industrial engineering.

Jafari, Morteza (2013). Applying the fuzzy TOPSIS method to the identification and ranking of factors influencing the performance of steel production companies. M.A. thesis, Islamic Azad University, Central Tehran Branch.

Javadian, Nikbakhsh, Khani, Mahdi, and Mahdavi, Iraj (2012). Identifying factors influencing supply chain management and its improvement using the system dynamics method. Management research in Iran, no. 3.

Karbasian, Mahdi, Javanmardi, Muhammad, Khaboushani, Azam & Zanjirchi, Seyyed Mahmoud (2011). Designing a composite approach using Interpretive Structural Modelling (ISM), TOPSIS and fuzzy AHP for selection and ranking of agile suppliers. Production and Operation Management Journal, no. 1, pp. 107-134.

Kazzazi, Abulfazl, Adel & Zangouyinezhad, Abudar (2012). Measuring the competitiveness of supply chains using the fuzzy approach. Roshd University Quarterly, no. 2, pp. 55-72.

Kazzazi,Abulfazl & Ruhollah Sohrabi (2010). Introducing the components and indicators of assessing supply chain agility in the National Iranian Oil Company (case study of National Iranian South Oil Company), evolution management bulletin, p. 144.

Ketchen, D.J. & Giunipero, L. C. (2004). "The intersection of strategic management and supply chain management". Industrial marketing management, 33, 51-56.

Khan Rai Waqas Azfar,Nawar, K., Hamza Farooq G.,(2014)." Performance Management: A Conceptual Framwork for Supply Chain Practices", 10th International Strategic C onference, V.150,PP.803-812.

Khorshad, Iman (2014). The effective relationship of supply chain partners as the most important supply success factor in the automobile industry. no. 183, pp. 6-15.

Kiani-mavi, Reza, Rangriz, Hassan, and Ostad Ali Akbar, Arman (2011). Determining the status of productions of Godakhtar industrial group in the supply chain for improving its performance using the fuzzy TOPSIS AHP. Supply chain management quarterly, no. 34, pp. 38-47

Lee E.K. Ha S. Kim S.K. (2000)."Supplier selection and management system considering relationships in supply chain management"; IEEE transactions on Engineering Management, Vol. 48, No. 39.

Loudon,K,Laudon,J. (2001),Management Information system, PREN TICE-HALL,2002.

Ma'navi Zadeh, Neda., Masoud Rabbani, Kamran Rezayi, & Jafar Razmi (2006). Measuring supply chain performance in four key guilds in Iran. Industrial Engineering Department, Tehran University Technical College, www.sid.ir.

Mahnaz Daneshyan, Hassan Dehqan Dehnavi & Mahmoud Moein al-Din (2014). Ranking factors influencing supply chain performance management. International conference on management in the 21st century.

Manian, Amir, Dehqan Nayyeri, Mahmoud and Akhavan Anvari, Muhammadreza (2010). Identifying factors influencing supply chain performance. Iranian management sciences quarterly, no. 17, pp. 67-87.

McCormack, K.P, Johnson, W.C., and W.T. Walker. (2012). Supply Chain Networks and Business Process Orientation: Advanced Strategies and Best Practices. CRC Press LLC. Boca Raton Florida.

Mentzer, John T, Stank, Theodore P. and Matthew, B.(2006), Why Global Supply Chain Management?

Muhammadi Zanjirani, Duruish & Muhammad Modarres Yazdi (2007). An evident approach to measuring the performance of supply chain: introducing an instrument for the design and development of top supply chains in Iranian industries. Third national conference on performance management, p. 7.

Qaseni, Seyyed Ali, Danesh, Shahnaz (2012). Application of the fuzzy analytical hierarchy method for determining the optimal option for desalination of salty waters. Water and Soil Publication, no. 26, pp. 999-1009.

Qazanfari, Mahdi, Riazi, Afshin, and Kazemi, Masoud (2001). Supply chain management. Tadbir, no. 117, pp. 20-27.

Rahman Seresht, Hussein, Rahman Seresht, Amir and Afsar (2008). The effect of information sharing on competitive strategies and supply chain management. Information and technology management journal, no. 1, pp. 37-48.

Sailin ,chin-T.,., chin-Beinchen.Ying-chan Ting, (2011),"An ERP model for supplier selection in electronic industry", Expert system with application,No.38,pp.1760-1765.

Salimi, Meqdad, Afshar Najafi, Behrouz and Vahdani, Behnam (2014). An adaptive decision making model based on TOPSIS for nonlinear large-scale multi-objective planning problems with angular block structures under uncertainty conditions. Industrial Management Quarterly, no. 35, pp. 83-121.

Saunders, M.J. (1995). «Chains, Pipelines, networks and value stream: the role, nature and value of such metaphors in forming perceptions of the task of purchasing and supplymanagement», FirstWorldwide.

Schnetzler, M.J. Sennheiser, A. & Schonsleben, P. (2007). "A decomposition-based approach for the development of a supply chain strategy". International Journal of Production Economics, 105, 21-42.

Shahbandarzadeh, Hamid & Alireza Peykam (2012). Introducing a model for identification of factors influencing supply chain management using the survey of new studies. Third national conference on industrial and systems engineering.

Shekari, Amir & Khosrowjerdi, AmirHussein (2006). Introducing a supply chain performance assessment system based on the EFQM excellence model. Second conference on logistics and supply chain, Tehran, Iran's Logistics Association.

Slack, N., S. Chamber, and R. Johnston,(2013), Operations Management, Pearson Ed.

Soleymani, Shiri, Q. (2009). Supply chain with a fusion of analytical hierarchy process and idealistic planning (case study of automobile industries). Management Quarterly, no. 15.

Srvulaki, E. & Davis, M. (2010). "Aligningproduct with supply chain processes and strategy". The international journal of logistic management, 21, 127-151.

Tabibi, Muhammadreza & Mazlumi, Nader (2009). Introducing a model for the analysis of selection and application of business supply chain strategies. Management Sciences Quarterly, no. 16, 139-154.

Taranoush Jafari & Mohsen Fathi (2011). Supply chain assessment using the Data Envelopment Analysis (DEA) method. third national conference on DEA.

Terkman, Peter, McCormack, b Kevin and valadares, Marcos paulo. s.l.,(2010), The impact of business analytics on supply chain performance : Decision Support Systems, , Vol. 49. 318-327.

Tseng, m. l. and chiu, s. f. (2010). "Evaluating firm's green supply chain management in linguistic preferences", "Journal of Cleaner Production", 22 (3), 265-289.

Vaezi, Fereshteh and Shahraki, Alireza (2011).The role and obligations of knowledge-based management in the success of supply chain management. Forouq Tadbir, no. 18.

Waggoner, D. B. Neely, A. D. & Kennerley, M. P. (1999). The forces that shape organizational performance measurement system: An interdisciplinary review. International Journal of Production Economics, 60, 53-63.

Xinyan, Z., Song, H., & George,H Q. (2009), Tourism supply chain management: A new research agenda., s.l. : Tourism Management, Vol. 30,PP.345-358.