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Investigation of the position of supply chain model in risk reduction and production increase in production planning of companies (Case study: Iran Khodro)

Ali Ghanbari

Department of Industrial Engineering, Sharif university of Technology, Tehran, Iran

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ABSTRACT

Automobile industry, which is called "Industry of industries" by Peter Drucker, is one of the most important industries. This industry has changed people's idea about manufacturing methods of products during 20th century. These changes have changed working style, lifestyle and also way of thinking. Thanks to the vital roles of the products of this industry including facilitate of communications in activities of society, these products has been considered by many people and governments. In some cases, the percentage of having a car has been considered as an assessment and evaluation criteria of the degree of development in the world.

Today, it would be important to aware of the importance of supply chain model and competitive strategies along with the increased competition and companies' efforts to gain more market share. Hence, it would be necessary to attention to the risk reduction and production increase. This paper has been conducted in order to assess the position of supply chain model in risk reduction and increase in production in Iran Khodro Company in Iran. The present study has investigated the known models and effective factors in supply chain management and their effect on two variables of risk reduction and increase in production in the statistical population (Iran Khodro). According to the collected questionnaires from 70 expert manufacturers in supply chain of products in Iran Khodro Company, the introduced factors included in supply chain model (presented in conceptual model of the study) have effect on risk reduction and increase in production.

KEYWORDS: supply chain management, risk, Iran Khodro, production.

INTRODUCTION

It is said that, competition among companies has transformed from the level of companies to their supply chain in the competitive world today (Ketchen, D.J & Hult, G.T.A, 2007). Having an efficient and smart supply chain is an important competitive advantage in competition (Kuei C, Madu C.N, 2001). Today, an efficient supply chain is a potential way to protect competitive advantage and improve organizational performance. In this way, the competition is between supply chains no organizations. The more effective the performance of supply chain is, the more efficient the performance of the organization would be (Suhong et al, 2005).

Gan Shawn has assessed the supply chain model in terms of its concept. He considers the supply chain management as the integrated management of material supply, physical distribution and logistics over the years. Cohen and Hochzymer have evaluated a scientific literature that is related to the analysis method for global supply chain strategy and planning (Amal Nik, M S, 2005).

Supply change management's target is to integrate the activities of supply chain with related information flows through the improvement of chain's relationships in order to achieve to a reliable competitive advantage (Heidari Ghare Bolagh, H. 2009).

According to the data released by the industrial management organization, the Engineering, designing and material supplier company of Iran Khodro under the name of "Sapco" is sixth among Iranian companies in terms of sales volume. 100 percent of shares of this company belong to Iran Khodro. Iran Khodro Company is the greatest company of domestic car manufacturer in Iran and its main customers are different sites of this company in some countries such as: Syria, Venezuela, and Senegal and also ISACO Company. The mission of ISACO Company is to design car spare parts and sets, supplying care spare parts and sets for domestic and foreign auto manufacturers, recognition of supply resources and assessment of their capability, selecting spare parts makers and supply contracts, try to promote manufacturers in terms of management and quality, marketing and leading manufacturers to make joint investments and export, leading self-sufficiency projects of spare part making and etc. accordingly, a company must be a network of qualified and competent suppliers in order to compete in global market. The process of selecting and evaluating of supplier has designed to create and maintain such network in order to expand suppliers' capabilities.

Risk and failure in supply chain have significant effect on short-time financial performance and also have negative effect on long-term financial performance of organization. Hence, it would be crucial to manage supply chain risk to reduce failures from different risks including uncertain cycles of economy, customers' uncertain demands, unpredictable human and natural disasters and etc. (Tang, 2006). Some effects of increase in production in order to reach the global scale can be mentioned as follows (Safaee Ghadikalani, A. 1999):

- Increase the level of manufacturing flexibility

* **Corresponding Author:** Ali Ghanbari, Department of Industrial Engineering, Sharif university of Technology, Tehran, Iran.
Email: *Aghanbari100@gmail.com*

- Increase the level of customer satisfaction
- Increase competitive power of production through reducing the investment in inventory, reducing production cycle, decreasing the product life cycle and increasing the ability to produce new products.
- Increase the dynamic level of the organization and its competitiveness.
- Attract and retain best staff and try to improve their moral.

Supply chain model is a collection of methods that is used to integrate suppliers, producers, warehouses and stores. In this way, the required products are available to customers in a certain amount and certain time and place. Accordingly, chain total cost would be minimum and needs of customers would be met in a high level of quality (Simchi. L.D, Kaminsky, P. 2000). Inventories have a key role in the success and failure of supply chain. Therefore, coordination of inventories throughout the supply chain is really important (Stevenson, 2004).

Supply chain management is a combination of art and science that improves the methods of finding raw materials for companies to have better production and service. Supply chain management has 5 main factors as follows:

- Planning process

Planning process include activities that make a balance between aggregated supply and demand in relation with every level of the chain in order to do the best operation of supply, manufacturing and delivery. In fact, planning process has more details including supply and demand management, management of business rules and regulations, supply chain efficiency, data collection, inventory, capital, transportation, design structure and meet the common needs, making balance between needs and resources and creating a general plan for supply chain that includes executive and returned activities, making adjustment and balance between plan and supply chain and finance. Planning process is related to the development of some parameters such as: supervising the efficiency, cost reduction and high-quality delivery of supply chain.

- Sourcing process

Sourcing process includes activities that provide the required goods and services in order to meet planned and real demands of customers. In fact, sourcing process includes scheduling deliveries, received, confirmation and transmission of products, issuance the payment license for supplier for not predetermined needs, management of business rules and regulations, efficiency assessment of suppliers, protecting and keeping information, inventory management, capital, input products, suppliers chain, export and import requirements and agreements made with suppliers.

- Manufacturing process

Manufacturing process include activities in which, raw materials and semi-finished products are transformed to finished products to meet planned or real demands of customers. In fact, manufacturing process has more details such as: planning of production activities, producing products, testing, packing, placing products in an appropriate environment, transferring products to delivery sector, completing the final steps of engineering, producing the ordered engineering products, rules and regulation management, data efficiency, in-process products, transportation, facilities and equipment, production network and meeting common needs of production.

- Delivery process

Delivery process include activities such as: order management, transportation and distribution that provide final services and products to meet planned or real demands of customers. In fact delivery process has more details as follows: all steps of order management from customer orders analysis to selecting the best method and way of transmission, warehouse management from receiving and unloading products to transmission, confirmation of received products and lunching them if necessary, presenting customer payment bill, management of delivery rules and regulations, efficiency, final product stock, capital, transportation, product life cycle and export and import requirements.

- Return process

Return process is a problematic sector of supply chain to create a network to get defects and returned products from customers and support those customers having a problem with the product. This process is related to supporting process of customers after delivery (Fiorino, 1989). In fact, return process has more details as follows: returning raw materials to supplier, receiving returned products' receipt from customers including defected, surplus and expired products, all stages of returning a defected product such as issuance of returned license, scheduling return, receive, review, sorting and locating of returned goods, all returning stages of an extra product such as: recognition the extra inventory, transporting schedule, receiving returned cargo, confirmation of returning license, receiving extra returned cargo in source sector, review, sorting and retrieval of cargo, management of returning rules and regulations, efficiency, data collection, inventory of returned products, capital, transportation, network configuration and meet the common needs.

The aim of this paper is to assess the position of supply chain model in order to reduce risk and increase in production in planning programs of Iran Khodro. Accordingly, the present study has investigated the effects of all factors of supply chain management including planning, sourcing, manufacturing, delivery and returning on production incensement and risk reduction. Risk types can be categorized as follows: financial risk, human resource risk, technologic risk, strategic risk and environmental risk.

THEORETICAL LITERATURE

SCM practices have been documented in measurement studies as well in research explored the relationship of SCM practices and organizational performance. Recent studies have begun to propose SCM practices as a multi-dimensional concept that covers upstream, internal and downstream side of a supply chain (Suhong et al., 2005). Their research has six empirically validated dimensions which include strategic supplier partnership, customer relationship, information sharing, information quality, internal lean practices and postponement. Also, Chen and Paulraj (2004) have

developed a conceptual framework and an instrument that would help researchers better understand the scope of both the problems and the opportunities associated with SCM from a holistic view. Their research has
Fifteen empirically validated dimensions and some of them do address SCM practices. This paper will adopt dimensions related to SCM practices from both mentioned papers as will be discussed in the research framework section.
Since 1980s, SCM has been considered as one of the most driving forces for firms to improve their competitive advantage and performance (Kannan, V.R., and Tan, K.C, 2005; Chin, O. et al., 2010). Some studies have examined specific practices of SCM to analyze the impact on organizational performance, while others operationalize SCM practices as a multidimensional construct and investigated the impact on organizational performance (Sohung et al., 2006; Kim, E. 2006; Chin. O. et al., 2010).
Kim has investigated the subject of Centralized admission and production control in a two-stage supply chain with single component and customized products in 2012.This paper considers a two-stage supply chain that a make-to-stock facility produces a single component in anticipation of future demand and a make-to-order facility produces customized products using components with the option of to accept or reject each customer order. We address the problem of centralizing the admission and production control that maximizes the supply chain's profit subject to the system costs. Using a Markov decision process model, we characterize the structure of the optimal admission control and production policy and establish the monotonic impact of system parameters on the optimal policy. Two heuristics are presented and their performance is numerically compared to the optimal policy under different operating conditions of the system.
A summary of studies that are base of the present study are mentioned in table 1.

Table 1: Review of past researches

Author	subject	methodology
Ritchie, B., Brindley, C., (2007)	Supply chain risk management (Performance a guiding framework)	Survey research
Boonyathan, P., Al-Hakim, L., (2007)	Procedure for Modeling and Improving E-SCM Processes	Applied research
Veliyath, R., (1996)	Risk performance and its effects	Survey research
Ziegenebein, A., Nienhaus, J., (May, 2004)	Supply chain risk assessment using Analytic network process	Applied research
Ratnasingam, P., (2007)_	A risk-control framework for e-marketplace participation	Fundamental research

METHODOLOGY

The present study is an analytical and descriptive study with the aim of investigation of the position of supply chain model to reduce risk and production increase in production planning in Iran Khodro. Statistical population of study includes Iran Khodro Companies that 70 members were selected from experts as the sample of study through random sampling method. Data collecting instrument was the questionnaire made by author. SPSS software has been applied for data analysis.
The conceptual model of study has presented in figure 1 in which, risk reduction and production increase are dependent variable and supply chain model is independent variable.

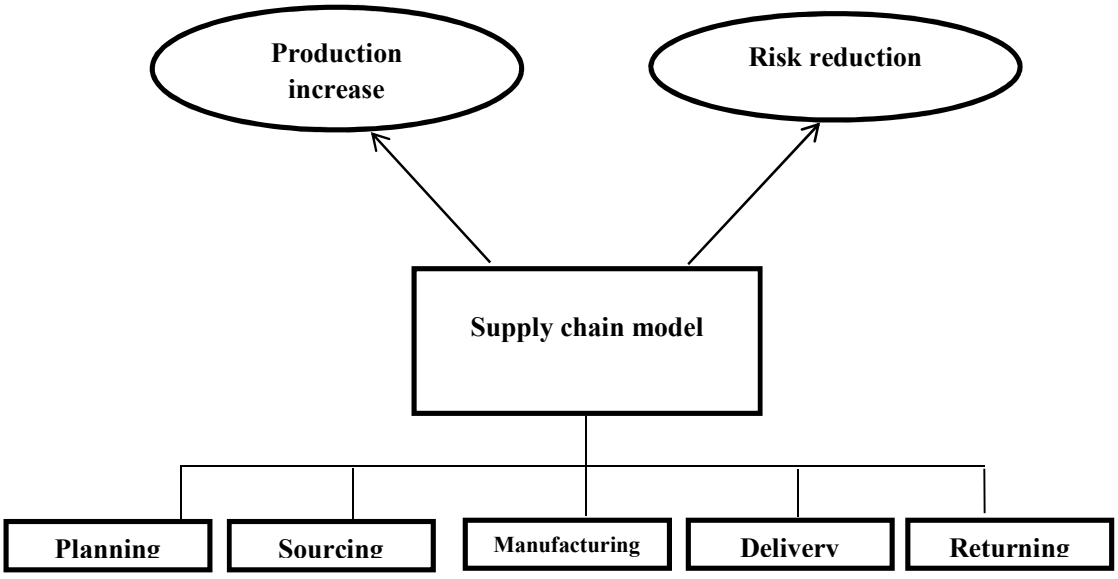


Figure1: Conceptual model of study

Data Analysis

In all studies, scholars collect data in order to answer the questions and hypotheses of the study. For this purpose, it would be essential to use common methods of classification to make a systematic collection of data. In this way, disordered data would be shown in tables and statistical diagrams. Statistical analysis of data is a part of scientific methodology which includes two basic objectives as follows: 1- description of empirical evidence which is gathered through the observance and experiment in terms of the study topic. 2- Explaining the obtained descriptive result in order to assess the hypotheses of study (Hooman, 2010). Hence, the present study has applied the obtained information of sample population to analyze the discussed hypotheses thorough SPSS software.

Descriptive statistics

In this part of study, descriptive statistics and related tables to sample features has been represented. Recognition of sample' feature can help scholars to determine general features of the study population. Collected data from 70 members of experts have been analyzed in table 1.

Table 2: Estimating the mean and standard deviation of assessment indices of supply chain model in company

Variable		Number of	Mean	Standard deviation
planning	Importance of research and development	**70**	3.82	0.658
	Estimation of forecast	70	3.74	0.606
	planning	70	3.75	0.600
Sourcing	Financial resources supply	70	3.67	0.630
	Supplier selection	70	3.65	0.611
manufacturing	Testing	70	3.72	0.657
	Packing	70	3.65	0.656
	Control and preparation	70	3.90	0.662
delivery	Orders and finance	70	3,77	0.593
	Warehousing	70	3,81	0.620
	transportation	70	3,72	0.635
returning	Defect fixing	70	3,75	0.624
	After sale services	70	3,70	0.622

The mean and standard deviation of assessment indices of supply chain model in company are estimated in table 2. According to the encoding of variables including very low, low, average, high and more than high it can be mentioned that the average of importance of research and development is equal to 0.658 ± 3.82, the average of estimation of forecast is equal to 0.606 ± 3.74, planning is equal to 0.600 ± 3.75, financial resources supply is equal to 0.630 ± 3.67 , supplier selecting is equal to 0.611 ± 3.65, testing is 0.657 ± 3.72, packing is 0.656 ± 3.65, control and preparation is 0.662 ± 3.90, orders and finance is 0.593 ± 3.77, warehousing is 0.62 ± 3.81, transportation is 0.635 ± 3.72, defect fixing is 0.624 ± 3.75 and after sale services is equal to 0.622 ± 3.70.

Inferential statistics

Assessment of data distribution

Kolmogorov – Smirnov test has been applied to assess the normality of data distribution. This test has compared the observed cumulative distribution function with expected cumulative distribution function in one sample state and one variable in sequential measurement level. In other words, this test compares the distribution of a trait in a sample with the assumed distribution for that society. In results interpretation, distribution would be normal if the significant level (sig) is more than the error probability level (a=0/05). Otherwise, distribution is not normal.

Table 3: Kolmogorov – Smirnov test

	Kolmogorov value	Sample size	Sig	Error level	result
Planning	0.952	70	0.324	0/05	Normal
Sourcing	0.947	70	0.331	0/05	Normal
Manufacturing	0.986	70	0.286	0/05	Normal
Delivery	1.348	70	0.053	0/05	Normal
Returning	1.091	70	0.185	0/05	Normal
Financial risk	1.103	70	0.175	0/05	Normal
Human resources risk	0.833	70	0.422	0/05	Normal
Technologic risk	0.905	70	0.386	0/05	Normal
Strategic risk	1.161	70	0.135	0/05	Normal
Environmental risk	0.698	70	0.715	0/05	Normal
Production increase	0.709	70	0.696	0/05	Normal

According to table 5, it could be found that based on obtained Kolmogorov – Smirnov value and significant level, all expected and observed distribution for variables are not significantly different. Therefore, the distribution of these data would be normal and parametric values can be used for hypotheses testing.

Hypothesis 1- The factors of supply chain model can effect on reduction of all types of risks.

H_0: The factors of supply chain model can't effect on reduction of all types of risks.

H_1: The factors of supply chain model can effect on reduction of all types of risks.

Factors of supply chain model include planning, sourcing, manufacturing, delivery and returning. Different types of risks can be mentioned as follows: financial risk, human resources risk, technologic risks, strategic risk and environmental risk.

In this paper, the regression analysis has been applied to assess the effect of supply chain model on risk reduction. Regression is a statistical analysis in which, changes in one or more dependent variables are explained or predicted against one or more independent nonparametric variables. In other words, regression is a powerful technique to evaluate the effects of one or more independent variables on dependent variable.

Table 4: Estimation of summarized regression Model

Row	Model	Multiple correlation coefficient	Determination coefficient	Adjusted determination coefficient	Durbin-Watson value
1	Financial risk	0.862	0.743	0.722	2.292
2	Human resources risk	0.817	0.668	0.642	1.553
3	Technologic risk	0.766	0.758	0.555	1.860
4	Strategic risk	0.867	0.752	0.733	2.091
5	Environmental risk	0.870	0.757	0.738	2.001

According to table 4 Durbin-Watson values is between 1/5-2/5 for all models. Therefore, hypothesis of independent errors is not rejected; therefore regression test could be used. Determination coefficients (effect and prediction) of independent variables can be found as follows: 74% financial risk reduction, 66% human resources reduction, 75% technologic risk reduction, 84% strategic risk reduction, and 75% environmental risk reduction. In other words, amount of changes in variables (types of risks) based on factors of supply chain model are fluctuated between 55% technologic risk reduction and 74% environmental risk reduction. These values are appropriate coefficients that prove the relative efficiency of model.

Table 5: ANOVA analysis and determination of significant level of model

Model	F-value	Sig
Financial risk	36.917	.000[a]
Human resources risk	25.770	.000[a]
Technologic risk	18.209	.000[a]
Strategic risk	38.892	.000[a]
Environmental risk	39.967	.000[a]

According to table 5 and obtained F value and significant level (sig<0/05) it could be found that the relationship is significant in confidence level of %99 for all models. In other words, there is a significant relationship between factors of supply chain model and risk reduction. Hence, H_0 has been rejected and hypothesis of study has been accepted.

Table 6: regression weighted-coefficients

	Financial risk		Human resources risk		Technologic risk		Strategic risk		Environmental risk	
	B	Sig	B	Sig	B	Sig	B	Sig	B	Sig
Planning	-.294	.025	-.502	.001	-.470	.005	-.405	.002	-.395	.002
Sourcing	-.511	.002	.060	.736	-.130	.514	-.326	.037	.152	.321
Manufacturing	-.094	.440	-.540	.000	-.206	.181	-.172	.150	-.242	.043
Delivery	-.034	.778	.094	.497	-.215	.166	-.240	.048	-.313	.010
Returning	-.007	.948	.000	.997	.138	.328	.155	.158	-.279	.012

In table 6, value of weighted coefficients for each variable on dependent variable (beta) and observed p-value of each variable with the dependent variable have been presented. According to the value of Sig< 0/05, it could be found that two factors of planning and sourcing have a significant effect on financial risk reduction. Meanwhile, sourcing factors has more effect on this risk reduction. 2 factors of planning and manufacturing have a significant effect on financial risk reduction. In terms of technologic risk reduction only planning factor has a significant effect on that. 3 factors of planning, sourcing and delivery have a significant effect on strategic risk. In terms of environmental risk reduction all of factors except sourcing have a significant effect on that.

Hypothesis 2- The factors of supply chain model can effect on production increase.

H_0: The factors of supply chain model can't effect on production increase.

H_1: The factors of supply chain model can effect on production increase.
The regression analysis has been applied to assess the effect of supply chain model on production increase. Multivariate regression has been applied to investigate the effects of independent variables and discovery of fitted model. Uncorrelated error is one of the conditions of using regression analysis. In other words, it won't be possible to use regression if there is a correlation between errors and hypothesis of uncorrelated errors is rejected. Durbin Watson test has been used to determine independent errors (the difference between actual and predicted values by regression equation).

Table 7: Durbin Watson test

	Durbin Watson value
Model	2.153

Durbin Watson value should be between 1/5-2/5. According to table 7, the obtained value is equal to 2/265 and it can be resulted that hypothesis of independence between errors is not rejected and regression test can be applied. Residuals of regression (the difference between actual and predicted values by regression equation) have been assessed in table 8.

Table 8: residuals of regression

	Minimum	Maximum	Mean	Standard deviation	Number of
Standard predicted value	-1.540	2.641	.000	1.000	70
Standard residual	-2.549	2.280	.000	0.963	70

Predicted values and residuals have been shown in table 8. Residuals are estimation of errors in a model. In other words, residuals should follow normal distribution if the model is appropriate for data. The standard predicted values and standard residuals must have the mean value of 0 and also the value of standard deviation should be equal to 1.

Table 9: input and output variables

Model	Input variables	Output variables	Regression method
First	Dependent variables of study	-	ENTER

According to table 9, all of variables of model have been input at once, without any specific order or certain blocking to be analyzed.

Table 10: Estimation of summarized regression Model

Row	Model	Multiple correlation coefficient	Determination coefficient	Adjusted determination coefficient
1	**First**	0.890	0.792	0.775

Table 10 has assessed the relationship between factors of supply chain management (planning, sourcing, manufacturing, delivery and returning) and variable of production increase. According to this table, multivariate correlation coefficient of independent variables with variable of production increase is equal to 0.89. Determination coefficient (effect and prediction) of dependent variables is equal to 0.79 and adjusted coefficient that is related to df is equal 0.77. In other words, change of production increase variable is equal to 0.79 based on mentioned variables' effects and is equal to 0.77 with the exact calculation of df. This value is an appropriate coefficient and proves the relative efficiency of model. As a result, 77% from changes in production increase has been explained by mentioned variables.

Table 11: ANOVA analysis and determination of significant level of model

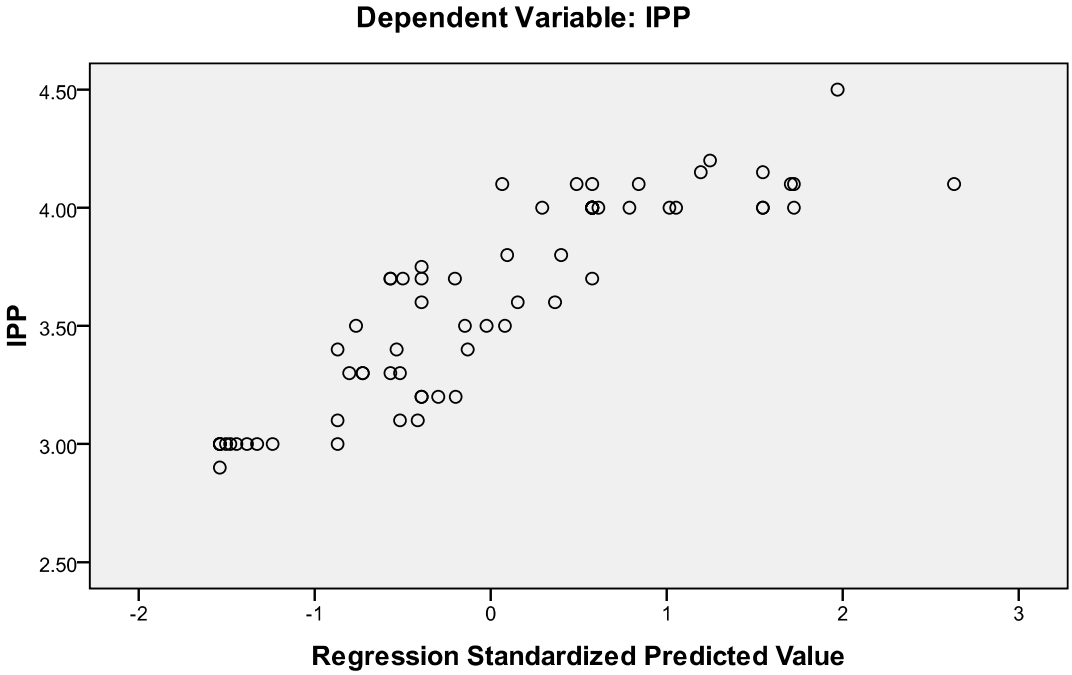
Model	Sum of squares	df	Mean-squares	F value	Sig
Determined(regression)	10,044	5	2.009	48.598	**.000[a]**
residual	2.645	64	0.041		
Total	12.689	69	69		

According to the table 11, it could be found that there is a relationship in the confidence level of 99% based on obtained f value and sig< 0, 05. It can be said that there is a significant relationship between factors of supply chain management and production increase. Hence, H_0 has been rejected and hypothesis of study is accepted.

Table 12: regression weighted-coefficients

Factors of model	Non-standard B	Standard B	t-value	Sig
Fixed coefficient	0.601		2.939	0.005
Planning	0.058	0.081	0.704	0.484
Sourcing	0.217	0.304	2.164	0.034
Manufacturing	0.243	0.394	3.709	0.000
Delivery	0.060	0.083	0.757	0.452
returning	0.229	0.317	3.184	0.002

In table 12, the values of weighted coefficients of every variable on dependent variable (B) have been categorized to standard, non-standard, t-value, observed error level (sig). Accordingly, it could be found that factors of sourcing, manufacturing and returning have a significant effect on dependent variable of production increase based on obtained standard coefficients (weighted effects) and t-value. Hence, the mentioned factors are predictors of production increase and manufacturing factor has the most significant effect on production increase considering standard B coefficient equal to 0.394.Considering the obtained coefficients, the regression equation of production increase variable can be explained based on dependent variables and fixed coefficient also the effective level of any dependent variable can be predicted for a unit change in the dependent variable. Scattering diagram of dependent variable based on independent variables has been illustrated in figure 2.



Conclusion

According to the obtained results from descriptive statistics, the mean value of importance of research and development is equal to 0.658 ± 3.82, higher than other assessment indices of supply chain model.

The obtained results from statistical test about hypotheses of study can be mentioned as follows:

Hypothesis 1: factors of supply chain management can effect on risk reduction.

Through the assessment of effects of the supply chain management including some indices (planning, sourcing, manufacturing, delivery and returning) on reducing risks (financial risk, human resources risk, technologic risks, strategic risk and environmental risk) it has been proved that the amount of changes in risk variable have appropriate coefficients. These changes can show the relative efficiency of model based on effects of factors of supply chain management. Therefore, there is a significant relationship between factors of supply chain management and risk reduction. Hence, this hypothesis has been accepted.

Hypothesis 2: factors of supply chain management can effect on production increase.

Based on obtained results, it can be found that changes in production increase can be explained by variables of supply chain management including planning, sourcing, manufacturing, delivery and returning). In other words, there is a significant relationship between factors of supply chain management and production increase and the hypothesis 2 is accepted.

This paper has been proved that the factors of supply chain management can effect on risk reduction and production increase in planning of Iran Khodro. Therefore, risk can be reduced and production can be increased by making changes in mentioned indices to gain competitive advantage for a company. Existence of uncertainties, increasing effective factors in supply chain and complicated production systems has brought a lot of adversities foe managers to achieve their goals. Every organization encounters with a different range of risks and hazards based on its activity and assets. Hence, it would be vital to make a risk management process to avoid upcoming obstacles and effective risks in management chain and also to increase in production.

In an article under the title of "An Exploratory Study of the Relationship between Supply Chain Management Practices and Technical Efficiency of Jordanian Manufacturing Companies" by Salhieh (2012) some points was mentioned as follows: Recent arguments states that competition is no longer between organizations, but among supply chains to support different competitive priorities. Effective supply chain management (SCM) practices have become a recognized way of achieving competitive advantage and improving organizational financial performance. This paper presents an

exploratory study of the relationship between (SCM) practices and organizational financial performance. Although research on the relationship was investigated by relating SCM practices and single organizational financial performance, but no research have surrogated many organizational financial performance in one measurement. Technical efficiency was used to surrogate organizational financial performance of Jordanian manufacturing companies. Data for the study was collected from 28 manufacturing companies registered in first market of Amman Stock Exchange. The results indicate a strong relationship between SCM practices and bottom-line profits of an organization.

Another study has been conducted to assess this subject "Supply Chain Risk Management on Tobacco Commodity in Temanggung, Central Java (Case Study at Farmers and Middlemen Level" (Muchfirodin, et al, 2015). This study aimed to identify and mitigate risks in tobacco supply chain in Temanggung Regency, Central Java Province, Indonesia, based on risk management principles in ISO 31000: 2009. The mitigation plan was composed by using tool of analytical network process (ANP). The results showed that the risk that was classified as avoidance risk at farmer level is weather, capital access, the price and quantity. At the middlemen level are impurity of quality, capital access, the price and quantity. And at the level are supplier quality variances, capital access, the price and quantity. Based on the ANP method, the strategy fits to mitigate risk bothered by the development of seeding technology.

Nooraee and Mellat parast has applied a research under the title of "A multi-objective approach to supply chain risk management: Integrating visibility with supply and demand risk" in 2015.This paper investigates the relationship among supply chain visibility (SCV), supply chain risk (SCR), and supply chain cost of new and seasonal products. We assume that demand is probabilistic and comes from different scenarios such as forecasting, benchmarking, and market analysis data. For utilizing multi-attribute decision modeling, we build a model to maximize SCV and minimize both SCR and supply chain cost from an operational perspective. A heuristic algorithm based on a relaxation method on decision variables is proposed to solve an NP-hard model, and to show how a multi-objective approach provides near-optimum solutions. The results show that more visibility is desirable, because it increases efficiency in a supply chain and decreases both cost and risk.

As it is clear from the obtained results in mentioned studies, supply chain management can significantly effect on efficiency of a company. In this paper, it has been proved that supply chain management can effect on risk reduction and production increase that lead the company to gain competitive advantage. In other words the obtained results of past studies can confirm this paper' results too.
Like other studies, the present study has also limitations and weaknesses that are essential to be mentioned:

- The first limitation to all studies is the lack of cooperation of studied population with the author with fear of exposing their personal information.
- The other problem is related to dispersion of different branches of Azad university of Tehran. Due to this, the author has had a lot of problems in distributing and collecting questionnaire.
- This study has been considered for Iran Khodro Company so the results can be more reliable if it is done in a greater population.

The results of this study can be conducted by managers in dynamic and complicated environments to reduce risk or increase in production of their supply chain. Some suggestions can be presented as follows:

- Thanks to the given situation of automobile industry, it would be crucial to be in world market in order to compete with foreign producers. Because of exclusive and supportive market of car industry in Iran, it would be a basic challenge for domestic producers to make a lot of changes in strategies and methods.
- It is recommended for organizations to reduce the risk in order to avoid the inside challenges and make a suitable conditions for new strategies and remain in world market.
- It is highly important to recognize risks interfered with supply chain to reduce them in car industry.
- Managers should be aware of the market trend and be able to predict the market demand considering components of demand.

REFERENCES

1- Amal Nik, M S., (2005), International Conference of Supply Chain Management.
2- Heydari Ghare bolagh, H., (2009), recognition of supply cahin management, (Researcher) Management Journal, 6th year, No14.
3- Safaee Ghadikalaee, A., (1999), designing production system in world level in medium and large companies in Iran, case study(car manufacturing), PhD Thesis, Tarbiat Modarres University.
4- Ketchen D.J, Hult G.T.M (2007). Bridging organization theory and supply chain management: The case of best value supply chains. Journal of Operations Management; 25: 573-580
5- Kuei C, Madu C.N (2001). Identifying critical success factors for supply chain quality management. Asia Pacific Management Review;6(4): 409-423.
6- Suhong, Li., Subba Rao, S., Ragu-Nathan, T.S., & Ragu-Nathan B. (2005). Development and Validation of a Management instrument for Studying Supply Chain Management Practices. Journal of Operations Management, Vol. 23, pp. 618-641. http://dx.doi.org/10.1016/j.jom.2005.01.002

7- Tang, C. S., (2006). Perspectives in supply chain risk management. International Journal of Production Economics, 103 (2), 451-488
8- Fiorino, D, 1989, "Environmental risk and democratic process: a critical review", Columbia Journal of Environmental Law , 501-547.
9- Simchi. Levi. D, Kaminsky. P, (2000) Designing and managing the supply chain, New York, Mc Graw Hill.
10- Stevenson. W, (2004) Operation management, New York, Mc Graw Hill.
11- Muchfirodin, Muchamad, Djoko Guritno, Adi, Yuliando, Henry. (2015)."Supply Chain Risk Management on Tobacco Commodity in Temanggung, Central Java (Case Study at Farmers and Middlemen Level) ",International Conference on Agro-industry (IcoA): Sustainable and Competitive Agro-industry for Human Welfare Yogyakarta-INDONESIA 2014
12- Nooraie, vahid, mellatparast, mahour.(2015)."A multi-objective approach to supply chain risk management: Integrating visibility with supply and demand risk" International Journal of Production Economics Volume 161, Pages 192–200
13- Kim, E., (2012)."Centralized admission and production control in a two-stage supply chain with single component and customized products", International Journal of Production Economics Volume 140, Issue 1, Pages 530–540
14- Salhieh, Loay.(2012), " An Exploratory Study of the Relationship between Supply Chain Management Practices and Technical Efficiency of Jordanian Manufacturing Companies", International Journal of Business and Management Vol. 6, No. 12
15- Suhong, Li., Subba Rao, S., Ragu-Nathan, T.S., & Ragu-Nathan B. (2005). Development and Validation of a Management instrument for Studying Supply Chain Management Practices. Journal of Operations Management, Vol. 23, pp. 618-641. http://dx.doi.org/10.1016/j.jom.2005.01.002
16- Chen, I.J., and Paulraj, A. (2004). Towards a Theory of Supply Chain Management: the Constructs and Measurements. Journal of Operations Management, Vol. 22, No. 2, pp. 119-150. http://dx.doi.org/10.1016/j.jom.2003.12.007
17- Chin, O., Liu, F., Hung, Y., and Yen, D. (2010). A structural model of supply chain management on firm performance. International Journal of Operations & Production Management, Vol. 30 No. 5, pp. 526-545. http://dx.doi.org/10.1108/01443571011039614
18- Kannan, V.R., and Tan, K.C., (2005), just in time, total quality management, and supply chain management: understanding their linkages and impact on business performance. Omega, Vol. 33, pp. 153-62. http://dx.doi.org/10.1016/j.omega.2004.03.012
19- Kim, S., (2006), Effects of supply chain management practices, integration and competition capability on performance. Supply Chain Management: An International Journal, Vol. 11 No. 3, pp. 241–248.http://dx.doi.org/10.1108/13598540610662149
20- Suhong, Li., Subba Rao, S., Ragu-Nathan, T.S., & Ragu-Nathan B. (2006). The Impact of Supply Chain Management Practices on Competitive Advantage and Organizational Performance. Omega, Vol. 34, pp.107-124. http://dx.doi.org/10.1016/j.omega.2004.08.002
21- Ritchie, B., Brindley, C., (2007), " Supply Chain Risk Management and Performance": A Guiding Framework for Future Development. International Journal of Operations and Production Management; 27(3): 303-322
22- Veliyath, R., (1996)," Risk Performance and Return": A Study of the Petroleum Exploration Industry. Management Science; 22(7):1004-1021.
23- Ziegenbein A., Nienhaus, j., (2004)." Coping with Supply chain Risks on Strategic", Tactical and Operational Level. Global Project and Manufacturing Management, The Symposium Proceedings
24- Ratnasingam, p., (2007). "A Risk-control Framework for E-marketplace Participation": The findings of Seven Cases. Information Management & Computer Security ;15(2) 149-166
25- Boonyathan, P., and Al-Hakim, L., (2007)." Procedure for Modeling and Improving E-SCM Processes" In: E-supply chain technologies and management. Premier Reference Source. Information Science Reference (IGI Global), Hershey, PA, United States, pp. 1-21. ISBN 978-1-59904-255-8