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Optimum strategy formulation using logistic element and supply chain of production factors

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ABSTRACT

In this research, Strategy formulation to use elements of logistics and supply chain factors is discussed. The statistical population consists of 43 managers of Iran automaker Company. Beginning with a review of previous research and interviews with the target population elements of logistics and supply chain factors identified using FAHP technique and the validation of the strengths and weaknesses have been identified. Then, using the opportunities and threats identified in terms of population Using SWOT technique and applying FAHP has been a good strategy. According to the management of supplier performance with minimum weight as the raw material weaknesses and asset management firm with a strong point of highest weight and the best strategy for the optimal use of these elements is WO strategy (revision strategies).

1. Introduction

Transition of different periods of production and marketing and emerging of intra-industrial era where knowledge and information are back bones of human movements, organizations and firms has faced to new challenges and in this according, competitive advantage is for organizations with attempted to purification of organization and their process with focus to make value and customer-oriented. In the middle, key to survival of today organizations is hidden to understanding and identifying of customer needs and immediate respond to these needs. Each organization large firms, government firms, or small business want to meet these desires of customers and various shareholders. Therefore, they require to material, equipment, facilities, and suppliers from other organization and performance of an organization is affected by activities of other firms that formed supply chain, efficient and effectiveness of each organization, in result of performance of management and structure of its supply chain (Poorsoleimani et al., 2014).

Iran Khodro company one of the biggest motor manufacturers in country. This company has annual nominal capacity of 55000 passenger car types and 15000 lorry types. Today with arrival of internal and external competitors (Chinese automakers) into market, this is in saturation condition. Thus, apart from production capacity of this company is unused. In past years, this company has been experienced increasing growth. Made planning for raw material and products have been done to in regarding to effective measures on demand and real demand and only according to past growth trend. Using this policy result in appearing the bull whip effect at its supply chain, and now part of its capacity remained useless and due to incorrect ordering, its ware house is full of raw materials. Now a days and production economy of due to making industry this company is the saturation and descanting point and in order to survival in this situation should be used to strategies that decreases its total production costs.

Logistic to mean the management of product flow information and or any kind of other sources; such as energy or humans between production site or supply site until consumption point or required to meet consumed needs (usually at military systems). Logistic included integration of information, transportation, inventory, storage, displacement, packing and security. Logistic is a part of supply chain that is added place and time value to it (Fathollah, 2015).

The supply chain of a firm or an organization served as a set of main activities, internal logistic, external logistic, functions, marketing and sale, supportive, service and activities. A supply chain has a three parts (Swafford et al., 2008):

Upstream: this part included of activities which a firm does in relation to suppliers at first layer and their relation to suppliers to lower layers. The relationship supplier could improve at different

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surfaces up to first supplier of materials, at this part the main activity is the preparation and supply.

The second part is inner supply chain, this part involving the overall activities which is done at delivery of product to main customer. This chain involve to distribution of storage, transportation, and after sales services. Each of activity which adds a value to product or services is a part of supply chain and involving life cycle of product.

2. Background

After laboratory studies, a similar study with current research wasn't found. To this reason it is examined to similar researches.

Jaafari and Forghani (2015); at a study namely "performance assessment of supply chain by using hierarchical phase analysis stated that in current years, supply chain management is a key factor for obtaining to competitive advantages. The better service to customer, increase income, and reducing of cost is result of this philosophy.

Organizations could manage improving of their performance by targeting, identification and definition of measurer and assessment of continuous performance. This evaluation creates a good vision to business position. In this article, after introduction in theatrical basis of performance evaluation of supply chain has provided a model for evaluation of performance of supply chain.

The main indicators of this article can indicate to a comprehensive classification of performance measures for total evaluation of components of chain and introduce a good decision-making method (phase AHP) to prioritize of measures and determines an importance degree of each them in total performance of supply chain. Finally, a case study in food industries has provided by using to analysis a phase hierarchy to naturalize of measure for mentioned industry.

Falguera (2010) at a research titled "simulation of performance evaluation of supply chain management (case study of Automaker Company from South Africa)" examined the evaluation of supply chain management considering a combination of management of suppliers and inventory. The first purpose was explaining a relation between management of supplier and inventory and introducing inductors which by management of supplier and inventory considering performance of a simulation model and decision-making tools for supply chain. Finally, an experimental design at an automaker company to better understanding the ability of decision-making tools was introduced.

Quantities procedure of SWOT analysis is provided the detailed data, for SWOT analysis. This procedure has adapted to a multi-measure decision-making method that is used multi layers patterns for simplification of complex problems and in according to this is able to operate a SWOT analysis on several organizations. Some of the procedures that is used a SWOT analysis, can be mentioned in matrix of EFE external factors evaluation and matrix of IFE internal factors evaluation and competitive plan matrix (Chang, 2004).

After reviewing of previous studies and literature and also several interviews with managers of various part of company, logistic elements and supply chain are identified before production of final product as follows (Ambe, 2010; Falguera, 2010; Stiess, 2015; Swafford, 2014; Ganishan, 2010):

1-Performance management of supplier of raw material (at the time of preparation of material, variability of supply time, rate of completion an order and contradiction at supply of total buying)

2-Management of functional sources for more benefits (sources included inventory, need to labor, equipment and energy)

3-Planning to displacement of raw material between transport and storage terminals (displacement of materials should be done in the right condition, at the right condition, at the right place, at the right time, in the right position, in the right sequence, by using the right methods and for thru right cost).

4-Management of inventory and storage (including the raw material and production equipment, placement and displacement of raw material and production equipment, selection and gathering the raw material and production equipment to exit)

5-Asset management (comparison of planned budget of supplier cost, transport and displacement costs, storage costs, labor costs and costs of equipment with real cost).

6-Management of development and research (research and development of technologies of production, research and development of diversely of production, research and development of competitive advantage of production and increase quality of production), which in case of correct survey and formulation a good strategy for these cases, the cost is reduced and cost price of products of this company is reduced. Then, main purpose of this study included:

1-Identify and review the position of logistic dimensions and elements and supply chain of production factors.

2- Construction a good strategy, for optimum use from logistic element and supply chain of production factors.

3-Priorities the proposed strategies by using of HAP phase group method.

3. Methods and material

This research is a one descriptive measuring and is a functional study. The purpose of this research is visible actual and regular description of features from one situation or subject. In other words, researcher trying to report all of the subject without any mental reasoning and take visible results from situation research of collection data are classified into two group of resource or primary and secondary information in the case of secondary

resource is used from articles, books, researches, studies and thesis at this area (that are collected by libraries and internet sites and available documents). The primary information was collected by using field procedure and researcher's questionnaire. Each of the questionnaires is organize double comparison which after collection will score by using AHP-Fuzzy and AHP-Fuzzy matrix.

4. Phase consequential analysis procedure

In topic literature, phase consequential analysis procedure, there are different methods in which their difference is on theory structure. Computation and complication of these methods leads to non-usability of these methods. Where change analysis method is easier than other FAHP method and is similar to traditional AHP. We preferred them to other methods in this study. Extent analysis method has been introduced by change in 1996 and is a Chinese researcher. Used numbers in this method are triangle phase numbers. Bozbura and Beskese (2014) in extent analysis method, for every couple comparing matrix row, S_K value is a phase number and is computed as:

$$S_k = \sum_{j=1}^{n} M_{kj} \times [\sum_{i=1}^{m} \sum_{j=1}^{n} M_{ij}]^{-1} \quad (1)$$

Whereas:

$$[\sum_{i=1}^{m} \sum_{j=1}^{n} M_{ij}] = \left(\sum_{i=1}^{m} \sum_{j=1}^{n} l_{ij}, \sum_{i=1}^{m} \sum_{j=1}^{n} m_{ij}, \sum_{i=1}^{m} \sum_{j=1}^{n} u_{ij}\right) \quad (2)$$

By reversing above relation, we have:

$$[\sum_{i=1}^{m} \sum_{j=1}^{n} M_{ij}]^{-1} = \left(\frac{1}{\sum_{i=1}^{m} \sum_{j=1}^{n} l_{ij}}, \frac{1}{\sum_{i=1}^{m} \sum_{j=1}^{n} m_{ij}}, \frac{1}{\sum_{i=1}^{m} \sum_{j=1}^{n} u_{ij}}\right) \quad (3)$$

k indicates row number, I, j indicates chooser and indicators.

After computing sk, we should get their greatness ration to each other. In general, if M1, M2 were two phases number, their greatness ratio would be computed as:

$$V(M_1 \geq M_2) = 1 \quad if\ m_1 \geq m_2$$
$$V(M_1 \geq M_2) = hgt(M_1 \cap M_2)\ \ o.w \quad (4)$$

In equation 4, we have:

$$hgt(M_1 \cap M_2) = \frac{u_1 - l_2}{(u_1 - l_2) + (m_2 - m_1)} \quad (5)$$

The amount of number greatness of triangle phase number from k other fuzzy number would be achieved by equation here:

$$V(M_1 \geq M_2, \dots, M_k) = V(M_1 \geq M_2, \dots, M_1 \geq M_k) \quad (6)$$

In order to compute indicators weight in couple matrix comparing, we have:

$$w'(x_i) = \min\{V(S_i \geq S_k)\} \quad k = 1,2, \dots, n, k \quad (7)$$

At last, indicator vector weight would be as:

$$w' = [w'(x_1), w'(x_2), \dots, w'(x_i)) \quad (8)$$

Normalized weight would be as:

$$W_i = \frac{W_i'}{\Sigma W_i'} \quad (9)$$

w is fuzzy number.

5. Results and discussion

After reorganization of logistic and supply chain factors, by studying books and several particles and evaluation of organizational chart of subjected firm under measures of these factors and in questionnaire framework with likert scale the validity of these factors become specified by measures of production factors.

And after completion of questionnaire by statistical community and obtaining the mean ideas and using of SPSS software, whole measures and sub measures is confirmed by statistic community.

In this study, after analysis of internal environment by all of the statistic community, the mean ideas is multiple at weight of obtained factors and final weight is obtained. Factors that have highest weight served as strength and one that have lowest weight served as weakness. In according to results, performance management of supplier with lowest weight as weakness and asset management with highest weight as strength point of firm are identified (Table 1).

Table 1: Identification of strength and weaknesses

Factors	mean of idea	weight of factors	final weight
factors of performance management of supplier	4.1	0.271	1.111
functional resources management factors	4.46	0.3267	1.45
planning of displacement raw material between transportation and storage terminals	4.32	0.3371	1.46
inventory and storage management	4.16	0.2761	1.15
asset management factors	4.99	0.4181	2.08
development and research management	4.23	0.3984	1.68

In order to identification of opportunity and real points, first analysis of external environment is done. Then adjusting, and to get ideas from statistic community and putting them at SPSS software (the mean higher than 4), therefore, those sub factors of SWOT which impact on success of the organization, but it can't control them, are identified. During interviewing with managers of firm under study (production factors part), 18 SWOT sub factors and 4 option of strategy are identified as shown at following table. By this table could observed that the organization have four option for strategies. One of strategies is SO which including good usage of opportunities by available strength points. WO

strategy is following to obtain profit from presented opportunities by external environment factors with considering weakness point of it. Also, ST strategy is relevant to use of the strength points to deletion or decrease of impacts of threats. Fourth and final strategy is WT, which at it organization trying that reduces its effect of threats (risks) by considering to weakness points. In this study, the purpose of SWOT analysis is determination of priorities of developed strategies and best strategy for organization (Table 2).

Table 2: Sub factors of SWOT and identified strategies at logistic and supply chain of production factors in Automaker Company

Weakness 1)supplier performance during agreement preparation 2)supplier performance during variability of production time 3)supplier performance during rate of completion of order 4))supplier performance during disagreement into supply of total buying	**Strength** 1)comparison of planned budget of supplier cost with performed actual cost 2) comparison of planned budget of transportation and displacement cost with performed actual cost 3))comparison of planned budget of storage costs with performed actual cost 4) comparison of planned budget of labor costs with performed actual cost 5) comparison of planned budget of equipment costs with performed actual cost	Internal Factors External Factors
WO strategy (review procedure) 1)promotion of electronic provision at relationship management with supplier (SRM) 2)establishing of shared public-privacy investment at supply of raw material for production of new products 3)interaction between managers and suppliers across advancement supply of segments 4)making use of several methods for evaluation and selection of suppliers by considering to original production 5)establishing of procedures for improving at share information at supply chain surface of production factors 6)strategic planning for improving quickness at supply chain of production factors	**SO strategy (competitive – aggressive strategy)** 1)development of internal logistic lines (displacement of raw material between storage and transportation terminals) 2)development of storage and centers of combining) 3)making use of export potentials 4)making use of several suppliers	**Opportunities** 1)lack of strong competitors at internal field 2)allowing to export into comrade countries 3)making use of several suppliers 4)support of public institutes at crises from company
WT strategy (protective strategy) 1-logistic promotion of suppliers (cellular production) 2-making use of public loans for supply of segments 3-compliation of strategies for encounter with international embargo and limitation of suppliers	**ST strategy (diversity strategies)** 1)selection of several suppliers 2)development of production technologies 3)establishing a diversity of raw material for divers at production and attracting internal customer 4)diversity at displacement procedure of raw material by focus on reducing cost	**Risks** 1)existence of international competitors (in particular, China) at internal market 2)limitation the number of foreign suppliers 3)increasing the rate of exchange 4)lack of energy 5)increasing the rate of inflation

In according to all of stages of identification of weakness and strength points and identified risk and also by using of FAHP technique are weighted, which overall results of ranking summarized at Table 3.

In order to compile of strategy, first we obtain the weight of all the measure in terms of each formulated strategies by double comparison questionnaire and get information from experts. Also, weight of each strategy was obtained and multiplies them and initial weights of factors until obtained the final weight of sub measure in terms of it. Then we calculate the rate of incompatibility and finally, in view the sum of normalized weights, strategies are ranking. All of these strategies have summarized at Table 4.

6. Conclusions and recommendations

In according to results of data analysis, the good strategy that we can formulize for optimized usage of logistic elements and supply chain at production factors of Iran Khodro Company is WO strategy (review strategies). In a sense that should be utilized of opportunities, that weakness inverted to strength points or must reducing intensity of weakness. In term of obtaining results proposed that by considering to effect of supplier on price and quality of products, from one organization and their important role in exit and survival of organization at industry and also accessing of organization to own goals, the company is consider to assessment of own

suppliers. Manager of company should be careful that providing of resources from suppliers would help to providing of goals and then more satisfaction of customers and its survival.

As a result proposed that this company is improved their relationship to suppliers. But, considering to main suppliers of this company are introduced by Saco and Tom firm, it is proposed that inspection during providing of raw materials was done by precise and be more. Although could by establishing and promotion of electronic provisions of relationship management to supplier (SRM), is providing a more complete and comprehensive. Also in view of result, the good strategy that we can propose to optimum use of logistic element and supply chain of production factors from Iran Khodro Company is WO strategy that proposed to perform following practices:

Table 3: Ranking sub measures factors of weakness and strength and opportunities and risk

S strength points	ranking
comparison of planned budget of equipment costs with actual cost	1
comparison of planned budget of transportation and displacement costs with actual cost	2
comparison of planned budget of storage costs with actual cost	3
comparison of planned budget of supplier cost with actual cost	4
comparison of planned budget of labor costs with actual cost	5
O opportunity points	
making use of several suppliers	1
possibility of export to comrade countries	2
lack of storage competitors at internal area	3
supporting of public institution at crisis	4
T threat points	
increased the rate of inflation	1
increased the rate of exchange	2
lack of energy	3
existence of international competitors (in particular, China) at internal market	4
limitation the number of external supplier due to international embargo	5
W weakness points	
comparison of planned budget of equipment costs with actual performed cost	1
comparison of planned budget of transportation and displacement cost with actual performed cost	2
comparison of planned budget of storage costs with actual performed cost	3
comparison of planned budget of supplier cost with actual performed cost	4
comparison of planned budget of labour costs with actual performed cost	5

Table 4: Weight of factors as regards to strategies

Factors	SO	WO	ST	WT
comparison of planned budget of supplier cost with performed actual cost	0.128	0.0145	0.0165	0.0543
comparison of planned budget of transportation and displacement cost with actual performed cost	0.2319	0.0981	0.1987	0.0065
comparison of planned budget of storage costs with actual performed cost	0.3271	0.0165	0.0198	0.0984
comparison of planned budget of labor costs with actual performed cost	0.0935	0.0155	0.1092	0.0126
comparison of planned budget of equipment costs with actual performed cost	0.2001	0.3474	0.0733	0.0213
performance of supplier during agreement preparation of material	0.0231	0.0065	0.0176	0.0942
performance of supplier during rate of completion of order	0.2046	0.1718	0.1179	0.3474
performance of supplier during variability of supply time	0.3903	0.0657	0.0215	0.0634
performance of supplier during disagreement at supplying of total buy	0.1179	0.032	0.0102	0.0163
lack of strong competitors at inner area	0.0324	0.0366	0.1718	0.0106
possibility of export to comrade countries	0.1567	0.0366	0.0213	0.0130
making use of several suppliers	0.3217	0.0349	0.0942	0.0023
supporting of public institution at crisis	0.3021	0.0326	0.3474	0.0213
limitation the number of foreign supplier due to international embargo	0.0983	0.3474	0.0021	0.0165
increased the rate of exchange	0.1894	0.0634	0.1267	0.0104
lack of energy	0.2178	0.0163	0.0309	0.0426
increased the rate of inflation	0.2769	0.0309	0.0231	0.0021
existence of international competitors (in particular, China) at inner market	0.1970	0.0034	0.0129	0.3092

1-Promotion of electronic provision in relationship management to suppliers (SRM)

2-Establishment of public-private shared investment in providing of raw material for production of new products

3-Collaboration between managers and suppliers in direction to advancement of supply parts

4-Making use of several techniques and procedure for evaluation and selection of suppliers (such as data capture technique) in terms of original production

5-Providing mechanisms to improve the data sharing in supply chain surface

6-Strategic planning to improve quickness of supply chain of production factors

Also, it is proposed that the following practices were done:

SO strategy (aggressive/competitive strategies): 1-development of inner logistic lines (displacement of raw materials between transport and storage terminals, 2-development of storage and centers to combination 3-making use of export potentials; 4-making use of variations suppliers

WT strategy (protective strategies): 1-logistic promotion of suppliers (cellular production/Kanban production) 2-making use of public loans to provide segments 3-providing several procedures to encounter to international embargoes and limitation of suppliers

ST strategy (diversity strategies): 1-selection of several suppliers 2-development of production technologies 3-providing a diversity in raw material for variety of production and attraction of inner customer 4-diversity at displacement method by focus on reducing the cost.

The following recommendations are present to future researchers:

1-budgeting of production factors and distribution of supply chain

2-more precise review of all logistic factors and inverted logistic in particular at automaker companies

3- Providing of strategy in automaker companies to optimum use of production factors and distribution of supply chain

4-making use of ANP and FANP methods at compiling of strategies to consider of inter relation of factors.

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