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Presenting a model to analyze the obstacles to cooperation in supply chain management

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Abstract

With the intensification of competition, the increase of customer expectations, and the emergence of new technologies, the activity space of organizations has experienced fundamental changes. Practical cooperation is considered the most critical factor in the performance of supply chains. This research aims to identify essential obstacles in implementing supply chain cooperation. By controlling, eliminating, or managing these obstacles, we can revive cooperation in the supply chain of Automotive Group. The potential impact of these findings is significant, as they can lead to a more effective management of supply chain cooperation. The statistical population consists of university professors with at least 10 years of work experience, and we use a judgmental sampling method with a sample size of 10 people. The data collection method involves a researcher-made questionnaire, and the data analysis process is done with the help of interpretive structural modeling. Cultural issues and 'inadequate education and understanding' were identified as the model's critical variables with the most significant impact on other variables. Creating a culture based on trust in the supply chain, the foundation of collaborative relationships, can help reduce cultural problems. Also, learning from colleagues will lead to the development of skills and capabilities and will improve the organization's attractiveness.

Keywords: obstacles, resistance, supply chain cooperation

1- Introduction

In recent years, supply chains and companies active in the network have witnessed more and more issues, such as political developments, market dynamics, and the shortening of product life cycles (Gölgeci et al., 2020). In the current business world, it is possible to create a high level of understanding of cooperation in the supply chain to provide better services to the market and society by identifying the obstacles to implementing cooperation (Hoffman et

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al., 2020). Cooperation can overcome obstacles by sharing resources and exploiting new opportunities (Simchi Levi et al., 2004). Today's turbulent and competitive environment imposes restrictions on organizations and businesses, which include restrictions on resources, skills, or specific organizational capabilities that prevent companies from achieving superior performance in the field of activity. It becomes their specialty. For this reason, chain cooperation seeks to improve the performance of the supply chain through the development of the cooperation mechanism (Mohammadi et al. et al., 2015). The lack of cooperation in the supply chain makes organizations face problems related to competitive advantages and prevents them from responding quickly in severe competitive conditions. It is essential to identify the critical variables with the most significant impact in the field of supply chain cooperation, as well as to examine the impact of other variables related to cooperation to analyze and examine them to find solutions for effectively managing this variable. As a result, the goal of this research is structural-interpretive modeling of cooperation drivers in the supply chain (Aliahmadi et al., 2015).

2- Literature review

In 2010, Ramesh et al., in research titled Modeling Barriers to Cooperation in the Supply Chain of the Clothing Retail Industry in India, used the interpretive structural modeling method to determine the relationships between the variables that hinder cooperation in the supply chain hierarchically. They divided them into dependent and independent variables. In this model, there are thirteen variables in eight levels. The variable "lack of understanding of the supply chain" was placed at the bottom of the model and was the most independent variable with the most significant impact on all variables. Also, the two variables, "lack of commitment of top management" and "lack of strategic and cooperative planning," were placed at the following levels in terms of importance. Also, "lack of competitive advantage" is the most independent variable at the model's top (Bakhshi Movahet et al., 2024).

The research innovation presents an interpretive structural model for the obstacles to cooperation in Saipa Automobile Group's supply chain. Compared to other studies, this model has eight variables and three levels.

3- Research method

This research is quantitative and applied. The aim of this research is the interpretive structural modeling of cooperation barriers in the supply chain. The statistical population of the research is composed of university professors with at least ten years of work experience and degrees in industrial engineering and management. Judgmental sampling method and sample size Considering that the ISM method is used, the number is ten people (Gavinden et al., 2012). The data collection method used was a researcher-made questionnaire to identify cooperation barriers in the supply chain. The data analysis is done with the help of the interpretative structural modeling method. In this research, the validity of the questionnaires based on the meta-combination method and the reference of the articles, as well as the validity of the ISM models according to the approval of the experts and the research literature, have been examined in terms of reasonableness. Also, the reliability of ISM questionnaires and models has been checked according to the convergence and stability created by Boolean multiplication (Bathaee et al., 2023).

The ISM method is an interpretive structural method that was proposed by Agarwal in 2006. In this method, the factors affecting the variable are first identified. Then, the relationships between these factors and the way to achieve progress by these factors are presented. Interpretive structural modeling is an interactive learning process that deals with the relationship between the concepts of a problem by interpreting the opinions of a group of experts.

To perform structural-interpretive modeling, five main steps are taken:

Forming the structural self-interaction matrix

Achieving matrix

Transferability matrix

Leveling of indicators

Drawing the influence-dependence power diagram

Step 1) Forming the structural self-interaction matrix

After identifying the underlying indicators of the phenomenon under study, an nxnsquare matrix of existing indicators is designed. This matrix is the same as the ISM questionnaire.

A structural self-action matrix (SSIM) consists of dimensions and indicators of study and their comparison using four modes of conceptual relationships. Process-oriented experts and specialists complete this matrix. The obtained information is based on the interpretive structural modeling of summation and the final structural self-interaction matrix. Interpretive Structural Modeling (ISM) logic works according to non-parametric methods and is based on the mode in frequencies.

Step 2) Received matrix.

The received reachability matrix is obtained by transforming the structural self-interaction matrix into a two-valued matrix of zero and one. To extract the received matrix, in each row of the self-interaction matrix, the number one is used instead of the signs X and V, and the number zero is used instead of the signs A and O. The obtained matrix is called the initial received matrix. The diameters of the main diameter are equal to one.

Step 3) Transferability matrix

After converting the matrix into a zero and one matrix, the secondary matrix must be designed. In a receiving matrix, secondary relationships must be controlled for reliability. If A leads to B and B leads to C, then A must lead to C. That is, if direct effects should have been included based on secondary relationships, but this did not happen in practice, the table should be corrected. The secondary relationship should also be shown.

In scientific language, the final achievement matrix is obtained by introducing transferability in the relations of indicators. It is a square matrix; each of its rows is one when the element has access to the element of any length and zero otherwise.

Step 4) Determination of relations and leveling of dimensions and indicators

The received matrix should contain the set of outputs and inputs for each criterion to determine the relationships and leveling of the criteria in the ISM interpretive structural model.

The achievement set (impact or outputs) includes the measure itself and its affected measures.

Prerequisite set (Effectiveness or inputs): includes the measure itself and the measures that affect it.

After determining the achievement set and the prerequisite set, the subscription of the two sets is calculated. The first variable for which the commonality of the two sets equals the attainable set (outputs) will be the first level. Therefore, the elements of the first level will have the most influence in the model.

After identifying the first-level indicators, these elements are removed, and the process of calculating the achievement and prerequisite set continues until all indicators are removed.

Step 5) Influence-dependency diagram

In the (ISM) model, the interrelationships and influence between the criteria and the relationship of the criteria of different levels are well shown, which leads to a better understanding of the decision-making environment by managers. In order to determine the essential criteria, the influence and dependence of the criteria are formed in the final access matrix. This feature is called Mic Mac analysis, which is entirely wrong.

4- Research Findings

For ISM analysis, the structural interaction matrix (SSIM) is created first. Then, in the next step, the primary achievement matrix (RM) is formed. In the next step, the modified achievement matrix is created. After forming this matrix, the level of criteria is determined.

By forming the attainable set and the advanced set and calculating their share in several steps, the final model is drawn as follows:

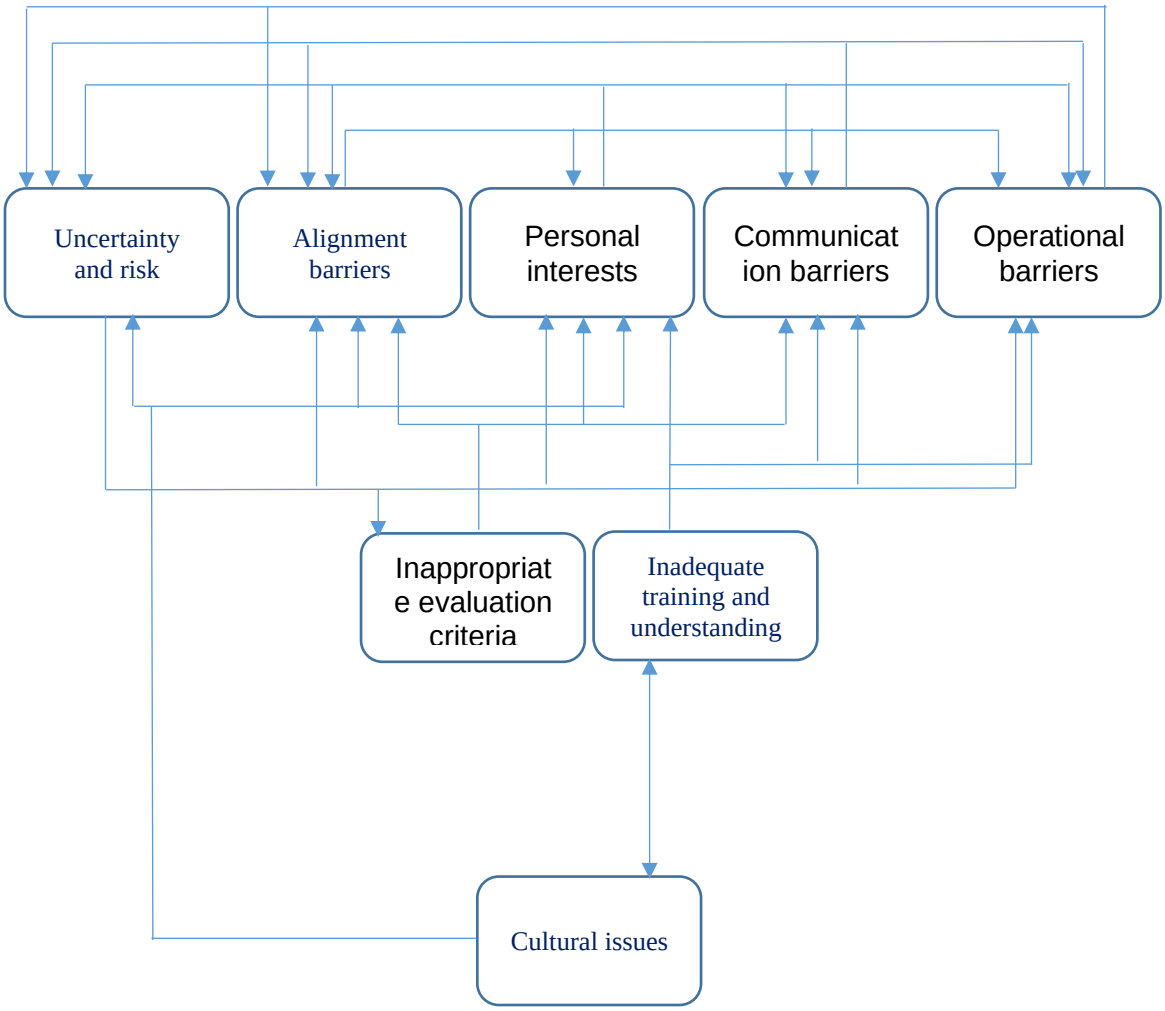

Figure 1: The model of barriers and resistances to cooperation in the supply chain

5- Conclusions and suggestions

This research used structural-interpretive modeling to examine supply chain cooperation barriers. For this purpose, a structural interactive matrix, primary achievement matrix, and modified achievement matrix were created, and the criteria level was determined. Finally, the final model was drawn by forming the achievable and the advanced sets and calculating their share in several steps. The levels of the variables are ordered from low to high based on influence. In terms of appearance, the lowest level in the model has the most influence and the most negligible influence, and when the variables of this level change, the system undergoes changes, and the most significant number related to the levels is assigned to them. They are also known as independent variables in the model. On the other hand, in terms of appearance, the highest level in the model has the most minor influence and the most influence and occupies the lowest number related to the levels. It is also known as the dependent variable in the model.

In the model of obstacles to cooperation, eight main obstacles were placed in the model as follows:

The variable of cultural issues as an independent variable influencing the system is at the bottom of the model, at level three. This variable affects four variables. In this way, cultural issues affect personal interests, barriers to alignment, and "uncertainty and risk" and have a reciprocal relationship with "insufficient education and understanding." Inadequate education and understanding are at the second level and affect operational barriers, communication barriers, personal interests, and a reciprocal relationship with cultural issues. Inappropriate evaluation criteria are at level two and affect three dependent variables: communication barriers, personal interests, and alignment barriers. It is also affected by the dependent variable "uncertainty and risk." Finally, the variables of operational barriers, communication barriers, personal interests, alignment barriers, and "uncertainty and risk" are dependent variables at the top of the model, at level one. There are also relationships among these five dependent variables. These relationships are as follows:

Operational barriers have a reciprocal relationship with alignment barriers and the variable "uncertainty and risk" and are affected by the variables of communication barriers and personal interests. The dependent variable of communication barriers affects the variable of operational barriers. Personal interests also influence it. It also has a reciprocal relationship with the variables of alignment obstacles and "uncertainty and risk." The personal interest variable affects alignment barriers, communication barriers, operational barriers, and "uncertainty and risk." Also, this variable is affected by alignment obstacles and "uncertainty and risk." The variable of alignment barriers has a mutual relationship with personal interests, communication barriers, and operational barriers and is affected by the "uncertainty and risk variable." The variable "uncertainty and risk" has a mutual relationship with three other dependent variables, namely communication barriers, personal interests, and operational barriers, and it affects the alignment barriers.

In the following, the practical suggestions related to the management and improvement of the independent (key) variables of the model are mentioned so that with their changes, other variables undergo changes, and finally, changes and improvements are made for the dependent variables of the model. be obtained in this model, two variables of cultural issues and "insufficient education and understanding" were identified as key variables with the most significant impact on other variables.

Cultural issues refer to issues such as lack of commitment, lack of trust, culture, and different work values that hinder cooperation in the chain. There are solutions to manage and improve these issues. Creating a culture based on trust in the supply chain, the basis for establishing and maintaining cooperative relationships in the automotive industry can help reduce cultural problems. Building trust makes the partner throughout the supply chain act in the best possible way, based on the interests of other partners, and the ability to rely on each other increases. Trust as a prerequisite lead to the formation of somewhat non-opportunistic behaviors. Also, to improve and create a culture of commitment, the distinguishing factor between leaving and staying is that it is possible to preserve and maintain relationships and ensure the continuity of a valuable colleague relationship. Managerial commitment is the main factor for promoting collaborative actions, which require integration, more effective management, and spending enough time and resources to build trust and establish relationships. Since resistance to change is also a cultural barrier that disrupts supply chain

cooperation, the chain needs process concentration to minimize unnecessary friction and disturbances.

"Inadequate training and understanding" as a main obstacle in supply chain cooperation includes lack of shared understanding, inadequate understanding of supply chain cooperation and philosophy, short-term view along the chain, and lack of knowledge and awareness. In order to solve these problems in the automotive industry's supply chain, solutions should be considered. For this purpose, the learning element should be updated. Establishing a learning process among supply chain partners lies within effective relationships. Learning from colleagues in the chain will develop skills and capabilities based on science and knowledge, increasing the organization's attractiveness. An effective learning process strengthens communication to motivate companies to share resources and information. The lack of a common understanding of cooperation and chain philosophy leads to maintaining a high level of cooperation and developing long-term relationships. These communications will lead to more successful coordination and collaboration to solve problems throughout the chain. Holding explanatory and operational workshops for the companies in this chain can implement the necessary training in this field.

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