

Assessment the Supply Chain Management to Mitigate the Risk Factors : A Case Study of Malaysian

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ABSTRACT

This is a case study of Malaysian manufacturing organizations to investigate risk factors. Since the globalization in industries has increased the uncertainties of demand and supply chain , so supply chain management is a critical effective risk mitigation tool . The risk events must be identified to provide a clear picture of global supply chain management and this can help the decision makers who strive in promotion , sale , distribution and production of goods . The basic result of risk assessment is profit maximization and this objective will attain using the effective supply chain management . This issue is considered in Malaysian Manufacturing Organizations to enhance the productivity of organizations.

Introduction

Supply Chain Management (SCM) is defined as managing chain of events that strives to balance activities such as promotion, sales, distribution and production. It can also be defined as profit maximization (Hise, 1995; Nelson and Toledano, 1979). In today's competitive and uncertain market supply chain vulnerability has become an issue of significance for many organizations. As of today supply chain is becoming more and more complex due to global sourcing and continuous trend of leaning down and as a result supply chain risk increases. Risk management is emerging as important contributor to most fields of management and decision control. The challenge to business organizations today is to mitigate that risk through creating more resilient supply chains. The motives behind organizations turning towards risk management approaches being the global competition, change in technology, and the continuous contention for competitive advantage (Brindley, 2004). A simple approach for viewing supply chain risk management focuses on two fundamental aspects which are probability of event actually occurring, impact of the event on supply chain and subsequently overall business. MIT Research group on "Supply Chain Response to Global Terrorism" shows that organizations generally concentrate on the type of disruption and not its source in order to know how to get it prepared against risk. Once the risk events are being identified effective methods for managing the risks must be developed. There are wide instances in the literature regarding the risks and vulnerabilities, and complex supply chains. The advancement of globalization in industries of any magnitude has increased uncertainties in both demand and supply and the likelihood of supply chain disruption. Surprisingly there is a lack of conceptual framework and empirical findings to provide clear meaning and guidance to visualize the global supply chain management. Global supply chains require highly coordinated flows of goods, services, information, and cash within and across national boundaries (Mentzer et al, 2001). Effective risk

management requires quantifying risk in order to place them in their proper context and to weigh the costs of risk and benefits of making particular decisions. Supply chain risk management offers improved focus on risk and therefore, more effective risk mitigation. This paper thus attempts to identify risk factors pertaining to supply chain management in context to Malaysian manufacturing organizations. **2.**

Literature Review

Supply Chain Management issues increasingly becoming more and more complex thus presenting greater risk. While going through the literature it has come to notice the failure and disruptions in proper flow of supply chain and as a result, organizations had to incur huge loss. Management must come up with the issues responsible for disruption of supply chain. So it has become necessary to identify some of the risk issues. This section deals with some of the risk factors affecting the supply chain management. Mitchell (1995) suggests that risk reducers include: to choose approved list of suppliers, multiple sourcing, choosing a leading organizations/companies, frequent visit to supplier operations, and to make a good communication and relation with suppliers. Zsidisin et al. (2000) focused on supply risks related to design, quality, cost, availability, manufacturability, supplier, legal, and environmental, health and safety. Based on the qualitative literature the researcher identified nine process based tools that helps in assessing supply chain risks from a supply chain context. The findings show, that less formalized processes and tools, are more popular than the formalized tools (Juttner, 2005). It has been argued that further research into frameworks for identifying risk sources from SCM perspective might be a first step in introducing risk management into design of supply chains (Sorensen, 2005). It has been argued that in the area of SCM, risk is less understood than in other disciplines and less developed. They suggest that empirical case studies to investigate: how the organizations actually cope up with themselves to manage supply chain risk, what are the process and techniques the

firms use to identify and analyse risk in their supply chains (Khan and Burnes, 2007). Ritchie and Brindley (2007) go on to argue that in order to conduct empirical research on risk in complex supply networks, tools are required for identifying, assessing and managing risk.

Methodology

Based on the review of literature and from the questionnaire survey from the organizations the researchers identified certain risk factors that need to be controlled. The content validity of these constructs was tentatively established by extensive review with top executives and other stakeholders. Some items were removed from the construct if their removal results in an increase in the reliability estimates, however care was taken to ensure the validity of the measures is not threatened by the removal of a key conceptual element. The different risk factors identified are: Disruption of supply, quality issues, technology uncertainty, breakdown of operations, technology change, introduction of new product, chaos in the system, IT security, interest rate, exchange rate, vandalism, govt. action, unanticipated resource requirement. The objective of this research is to prioritize the risk factors and to put the results before the industries so that no disruption takes place for the operation of smooth supply chain management.

Data Collection Procedures: The data collection phase of the literature review has involved exhaustive search of many of the prime Management journals including that the researchers could access. In addition to, the preceding journals, some conference papers, articles, were also accessed as well as ,the following databases were searched like Emerald, Science Direct, Proquest, Ebscohost, Springer, J Store etc. Invitations to participate in the survey requested responses from the organizations that were small scale industries in nature and the target respondents in each organizations were Director of logistics, Chief operation manager, Controller of stores, and other officials and people

who were directly or indirectly involved in managing proper supply chain and logistics operation in those organizations. Overall 90 respondents were obtained for overall analysis.

Results

In this research, the raw data was captured in a spread sheet software package. The spreadsheet was then converted into statistical software package (SPSS.17). The researchers performed factor analysis on the explanatory variables with the primary objective of determining minimum number of factors that account for maximum variance in data. Here, principal component method with varimax rotation has been applied. It is used so as to reduce the number of variables (Jolliffe, 2002). It gives loading for each combination of variables and loading factors. Higher loadings mark a higher correlation between variable and factor. Thus, the factor can be interpreted as underlying latent variables. In this study, we follow the Kaiser criterion (Kaiser, 1960), which suggests selection of those factors with Eigen values having values greater than 1. PCA is a procedure, which is widely accepted in various applications of information systems domain and also proved to be feasible in research method (Karimi et al., 1996; Chang & King, 2005). Table 1 summarizes the proportion of each factors variance explained by the other factors. Initial communalities are the estimates of the variance in each variable accounted for all components or factors. Extraction communalities are the estimates of the variance in each variable accounted for by the factors (or components) in the factor solution. Smaller values indicate those variables, which do not fit well with the factor solution, and we must eliminate them from the analysis. Table 1 represents the communalities table. Communalities indicate the amount of variance in each variable that is accounted for.

Table 1: Communalities

Extraction	Initial	Factors
.699	1.000	Disruption of supply
.774	1.000	Quality issues
.790	1.000	Technology uncertainty
.841	1.000	Breakdown of operation
.751	1.000	Technology change
.670	1.000	Introduction of new product
.767	1.000	Chaos in system
.665	1.000	IT security
.727	1.000	Interest rate
.615	1.000	Exchange rate
.602	1.000	Vandalism
.762	1.000	Govt. action
.770	1.000	Resource requirement

The data collected on failure factors of SCM first being examined to check whether the data could be analyzed by doing factor analysis or not. The results of this analysis indicate that the correlations among the factors were high and also the Bartlett's test of sphericity was significant. The data were hence found suitable for factor analysis. The researchers performed exploratory factor analysis on the different measures to purify the instrument and in order to validate the various dimension of failure factors for supply chain management. Table 2 below presents the Eigen values in decreasing order. Only Eigen values greater than one are included in final solution. Eigen value gives the ratio of variation in the data explained by each factor to the variation in the data explained by all the variables. It shows cumulative variance of 72.57% which means that factor analysis is satisfactory. Here factor analysis has been performed on 13 items leading to the extraction of 6 components.

Table 2: Total Variance Explained

Rotation sums of squared loadings			Extraction sums of squared loadings			Initial Eigen Values			Component		
Cumulative %	% of variance	Total	Cumulative %	% of variance	Total	Cumulative %	% of Variance	Total			
14.092	14.092	1.832	18.668	18.668	2.427	18.668	18.668	2.427	1		
26.459	12.366	1.608	31.475	12.807	1.665	31.475	12.807	1.665	2		
38.655	12.196	1.585	44.048	12.574	1.635	44.048	12.574	1.635	3		
50.489	11.834	1.538	54.729	10.681	1.389	54.729	10.681	1.389	4		
61.739	11.250	1.463	64.754	10.025	1.303	64.754	10.025	1.303	5		
72.574	10.835	1.409	72.574	7.820	1.017	72.574	7.820	1.017	6		
78.686		6.112			.795				7		
83.938		5.252			.683				8		
88.802		4.864			.632				9		
92.355		3.552			.462				10		
95.769		3.415			.444				11		
98.084		2.314			.301				12		
100.000		1.916			.249				13		

Table 3: Rotated Component Matrix

Component	Factors					
	6	5	4	3	2	1
.264	.733	-.266	.075	-.012	-.127	Disruption of supply
.134	-.025	-.035	-.067	.854	.143	Quality issues
.038	.091	-.020	.056	.881	-.029	Technology uncertainty
.892	.154	.027	-.056	.132	-.040	Breakdown of operation
.468	.411	.058	.026	.077	.594	Technology change
.079	.120	.028	.182	.166	.767	Introduction of new product
-.097	.724	.287	-.147	.135	.332	Chaos in the system
.004	.009	.786	.046	-.066	-.203	IT security
.208	.169	.365	.142	.137	-.695	Interest rate
.067	-.054	.773	-.002	-.001	.103	Exchange rate
.489	-.378	.167	.057	.081	.427	Vandalism
.023	.047	-.007	.869	.028	-.054	Govt. action
-.052	-.086	.054	.856	-.038	.151	Resource requirement

The rotation minimizes the number of variables having higher correlations on factor. As the rotation is orthogonal the resulting factors will be uncorrelated. In the rotated factor variables with higher factor loading is considered as most important. Thus from Table 3, the most

influencing risk factors affecting supply chain operations are: new product introduction, technology uncertainty, govt. action, IT security, disruption of supply, breakdown of operation. For reliability analysis we calculate Chronbach's alpha which assesses how well a set of items measures a single unidimensional latent construct. Alpha is a measure of the items that provides a test for surveys internal consistency (Reynaldo and Santos, 1999). However the cronbachs alpha in our case is more than the minimum suggested level as per Hair et al., (1998). As per higher factor loading we prioritize the risk factors:

Table 4: Priorities of six most influencing factors

Priority / Rank	Factor Loading	Factors (Components)
5	.767	Introduction of new product
2	.881	Technology uncertainty
3	.869	Govt action
4	.786	IT Security
6	.733	Disruption of supply
1	.892	Breakdown of operation

The results above shows the prioritized factors with the objective that if these factors are given proper attention then it would lead to proper functioning of supply chain management.

Conclusion

Even after devising strategies and prioritizing the risk factors in supply chain in context to Malaysian manufacturing organizations, all risks cannot be avoided. Risk mitigation planning provides an organization with a more mature decision making process in facing unexpected losses being caused by unexpected events. Existence of supply chain can be seen in both service industries as well as in manufacturing industries and the complexity variation occurs from industries to industries and from firm to firm. Beside other issues organizations must consider the overall costs including cost of space, expenses related to doing businesses outside country. With this the socio – economic, political and cultural dimensions can be considered as important issues in order to manage the

supply chain risks. This study provides a partial support for the explanation of risk mitigating issues in context to Malaysian supply chain matters. The prioritized factors would help supply chain managers to identify, assess and plan for risk. It is expected that the outcome of the results from this research study will be beneficial to the organizations which wishes to leverage the benefits of smooth operations of supply chain management. If the risks are being controlled effectively the efficiencies of supply chain would maintain a balance between financial considerations and that of the customer. This research study has also some limitations that the study is specifically targeted to manufacturing organizations. Apart from manufacturing in particular the researchers also can consider other variety of organizations like Retail, Pharma, aviation, construction, etc. There is scope to enhance this study by taking different industries and increasing the number of respondents into consideration.

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