Offshoring Decision Based on a Framework for Risk Identification

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Abstract. Offshoring has been a growing practice in the last decade. This involves transferring or sharing management control of a business process (BP) to a supplier in a different country. Offshoring implicates information exchange, coordination and trust between the overseas supplier and the company that means to assume risk. In this paper categories and types of risk have been hierarchically classified using a new approach with the aim to propose a multilevel reference model for Supply Chain Risk evaluation. This classification has been used to analysis the offshoring decision taking into account not only operational and financial risks but other aspects as strategic, compliance, reputation and environmental. The proper risk identification can help to take the correct decision whether or not to bet on offshoring or maintain all the processes in the country of origin.

Keywords: Offshoring, risk identification, Supply chain.

1 Introduction

The decline in manufacturing jobs in industrialized countries has been stunning since 1998 and this tendency cannot be completely explained in terms of higher productivity of these nations. Likely the main reasons are the offshoring strategies of multinational enterprises as well as the manufacturing output reduction due to the global economic situation.

Nowadays governments are focusing their interests on internal manufacturing sector because it is the source for jobs creation using innovation as key driver. Furthermore, the national production of a country helps reducing the trade deficit.

But additionally to the interest of different governments to attract the production of national enterprise that previously manufactured at home, some enterprises had found that offshoring it is a risky option. For example, Ravi Aron and Jitendra V. Singh explained in detail the case study of Alpha Corp in 2003 [1].

In general, there is a consensus among academics about main causes of offshoring implementation failures:

a. Enterprises did not distinguish between core and non-core business processes.
b. They only took into account saving costs in order to maximize economic benefits.
c. Offshoring strategy is not an all-or-nothing choice. Hybrid strategies are feasible.

L.M. Camarinha-Matos and R.J. Scherer (Eds.): PRO-VE 2013, IFIP AICT 408, pp. 540–547, 2013.

To evaluate adequately the offshoring decision and to avoid previous mistakes, authors propose to develop a specific framework to manage business risks in the supply chain (SC). It will be crucial to consider a wide risk category and the overall impact in each member of the SC.

2 Value of This Study

Multinational enterprises and SCs must always take strategic decisions to set and place their production processes. The best decision would be to retain "in-house" the core segments of the SC while the others are properly dispersed or disaggregated. This is not an easy decision because although offshoring/outsourcing can capture external talent, at long term can be a risk to the SC. It is fundamental to take into account high-end activities (e.g. product development and R&D) [2].

In addition, an alternative option to outsourcing / offshoring has to be considered. Collaborative network of SME's can also satisfy the random nature of customer behaviour and dynamic changes of demand patterns [3].

Supply Chain Risk Management is based on a "well known" methodology called SAM which consists of three tasks: Specifying sources of risk and vulnerabilities, Assessment, and Mitigation [4]. However it is difficult to apply it in "real life" due to the absence of a complete framework for supply chain risk management. The objective of this paper is to establish a comprehensive risk classification framework to facilitate the search of risk sources [5].

Many papers highlight and detail the implications of each type of risk associated with the different activities of the SC. Among them, Kumar et al. work has to be emphasized because it gives a first approach of all the causes of offshoring risk decisions [6]. Starting from this point, but covering all the possible risks that may affect the SC, in this paper a risk hierarchical classification has been created. This will help enterprises to address the right decision whether or not to bet on offshoring or maintain all the processes in the country of origin. It will also help government to know the risk associated to offshoring and in this way to develop policies in order to mitigate risk in the own country and to retain or attract companies.

3 Methodology

3.1 Literature Review

Literature review has not been centred in a specific topic like "offshoring risk". Using Sciverse Scopus© the search process has been done, starting with general keywords like "supply chain risk" or "business risk" and finishing it with specific keywords like "risk identification" or "offshoring risk".

The initial papers list covered 45 articles from major science-cited journals. Because of multi-disciplinary nature of the SC management, different knowledge areas specified by Kumar have been taken into account. Due to the space constrains the full list of papers is not included, but authors can supply it on demand.

From all these papers 22, are found much more relevant for the intersection mentioned above (see table 1).

Table 1. Distribution of the articles found with respect to journals

Supply Chain Management: An International Journal	5
International Journal of Production Economics	3
International Journal of Physical Distribution & Logistics Management	2
Journal of Manufacturing Technology Management	2
Journal of Operations Management	1
R&D Management	1
MIT Sloan Management Review	1
Production and Operations Management	1
Journal of Risk Research	1
Journal of Purchasing & Supply Management	1
Journal of Management Information Systems	1
Information Systems Management	1
International Journal of Operations & Production Management	1
Harvard Business Review	1
Total	22

3.2 Proposed Framework for Risk Classification

Considering the literature review, it has been found that the issue of risk identification has been a matter of interest to many authors for a long time, and of which even there are some specific papers.

Although some authors have classified these risks according to existing frameworks or creating a new one, authors have not found a generic framework to evaluate the overall SC risks. For instance, a simple way to classify risks was introduced by P.R. Kleindorfer and G.H. Saad [4], in this case authors classified risks in three categories: operational contingencies, natural hazards and political instability. D. Bandaly et al.[7] as well as Klimov et al.[8] included a distinction between risk that are internal or external to the supply chain. Chopra et al.[9] and Blackhurst et al.[10] preferred to disaggregate risks in specific categories such as disruptions, delays, inventory, information systems etc. Probably, an excellent generalisation of all the previous classifications for operational risk management is the work of O. Tang and S.N. Musa [11]. Operational contingencies were classified by the authors attending to the three types of flow in SC: material, information and financial. Furthermore these authors subdivided these categories using SCOR basic processes as drivers for a second level of classification. The limitation of this work is that management and relationship aspects are out of scope. In the case of Global Sourcing, Christopher et al. [12] divided the risks in process, control, demand, supply and environment. Focusing on offshoring Olson et al [13] used a similar classification to the one done by Chopra et al [9], but in the case of Kumar et al. [6], the authors introduced cause-effect fishbone diagram to map offshoring risks.

In our proposed Framework for Risk Identification (FRC), Kumar specific map was the starting point to determine and to prioritize main risk categories. Then, SC reference models were used to disintegrate them into types of risk. For instance,

SCOR [14] was an excellent option to subdivide process risk categories whereas GSCF [15] was a standard to create technology and people risk elements.

Table 2 represents author's proposal Framework for Risk Classification, an extra column has been added to clarify the number of citations. This column indicates the number of papers in which this risk appears in order to show the importance given by other authors for each specific risk element.

4 A First Approach about Offshoring vs Reindustrialization Decision Using Author's Framework

Strategic decisions like offshoring, outsourcing or alliances with other enterprises to establish a collaborative network can have a huge impact on Supply Chain. Therefore all the supply chain members must agree it. As mentioned before, it is crucial to apply SAM methodology in order to mitigate consequences [4, 16].

A framework such as the proposed in table 2 facilitates to specify the sources of risk, which is the first phase of SAM methodology. Second stage of SAM methodology is assessment; authors propose to use a questionnaire in order to evaluate different scenarios (current situation vs offshoring, reindustrialization…). Its first column gathers all the elements of risk extracted from table 2. Alternative scenarios will be represented in different columns, each of them will include four elements: subjective priority (S-priority), probability (P), impact (I) and Value at Risk (VAR). Questionnaire processing will be divided in two stages:

- First, S-priority is fulfilled by SC managers and their feedback will be weighted according with its authority level. Due to complexity of SC networks, only risk elements which have a relevant averaged variation for the whole SC between different scenarios will be deeply investigated. At this point, it is important to remark that exist several alternatives to assess risks. Authors have decided to use an alternative based on subjective priority, although other structured techniques like Analytic Hierarchy Process (AHP) or Analytic Network Process (ANP) are feasible for multi-criteria decisions [17].

- Second, the probability and economic impact of each relevant element will be calculated. Although probability determination is out of scope, a Bayesian networks can be a properly approach [18]. Total cost determines the economic impact value. Finally authors have decided to use SCOR strategy for risk evaluation based on VAR metric, which is calculated as $VAR=P \cdot I$ [14].

Table 2. Proposed framework for risk classification

1. STRATEGIC RISK	Cited by	2.OPERATIONAL RISK	Cited by
1A. Adverse business decisions risk	18	2A. Structural risk	2
Misunderstanding what product to transfer	4	Inappropriate storage/warehouse for incoming product/part from suppliers	2
Opportunism risk	3	Inappropriate final product warehouse before deliver	1
Price volatility of commodity/alternative energy	3	2B. External SC processes risk	20
Alliances, joint-ventures, acquisitions	1	Delay at ports due to port capacity or congestion	2
Partner become a competitor	1	Augment in transport capacity required	2
Risk of particular segment of supply chain being crippled	1	Port strike	1
Partner business continuity	1	Transportation breakdowns	1
SC Sustainability risk	1	Higher costs of transportation	1
Loss of synergy across firm activities	1	Custom clearances at ports	1
Not finding qualified personnel	1	Uncertainty about transit time	1
Loss of internal capabilities/process knowledge	1	2C. Source process risk	17
Loss of managerial control	1	Supply product monitoring/quality	8
Loss of core group	1	Supplier inability to conform to specification	4
1B. Improper SC implementation risk	6	Supplier selection	4
Poor partner collaboration	3	Inflexibility of supply source	4
Lack of SC visibility	2	High percentage of key component or raw material procured by single source	4
The difficulty of cross-functional and cross-locational coordination	1	Supplier deliver discontinuity or low reliability	4
1C. Information system risk	8	High dependence on supplier	3
Information infrastructure breakdown	3	High capacity utilization supply source	3
Lack of effective system integration	3	Low supplier capacity to absorb a higher demand	3
Information accuracy	2	Quality of service	3
Vertical integration of SC	2	Supplier bankruptcy	3
Very complex IS due to global outsourcing/offshoring	2	Poor supplier collaboration	2
1D. Competitor risks	4	Poor quality or yield at supply source	2
Competitors actions	3	Supplier financial instability	2
Product does not provide competitive advantages	2	Supplier fulfilment errors	2
Low impact of the introduction of new product on market	1	Supplier low readiness to accept modifications if required	2
Competitive product being launched before launch of new product	1	Non-standardized workflow, in communication with supplier	1
Response actions towards public and media expected from competitors	1	Sudden demise of supplier	1
Not foreseeing future competitor's challenges	1		

Table 2. (*continued*)

2.OPERATIONAL RISK (cont)	Cited by
2D. Make process risk	8
Rate of product obsolescence	5
Operational disruption/Manufacturing breakdown	4
Production capacity risk	3
Inventory risk	3
Product and process design risk	2
Poor production quality	2
Inventory holding cost	2
Fluctuations on product value	2
Demand and supply uncertainty	2
Lower process yields	2
Higher product cost	1
Products causing safety hazards	1
Processing delays	1
2E. Deliver process risk	12
Demand volatility/seasonability	3
Late deliveries	3
Balance of unmet demand and excess inventory	1
Paperwork and scheduling	1
Shipment disruptions	1
Packing requirements and parts size	1
Poor customer collaboration	1
Dependence on customer	1
2F. Return Process risk	2
High volume of product return from customers	2
2G. Plan process risk	8
Inaccurate forecasts due to longer lead times, excess of variety, swing demand or life cycle	5
Uncertain supply lead time	4
Fluctuation in raw materials, finished product, labour prices	3
Contract type and compliance	3
Uncertain customer demand	2
Uncertain supply yield	2
Uncertain costs	1
Order fulfilment errors	1
Information distortion due to sales promotions	1
Exaggeration of demand during product shortage	1
Inappropriate inventory plan	1
Inappropriate warehouse/storage plan	1
Uncertainty over long-term impact on supply and demand	1

3.COMPLIANCE RISK	Cited by
3A. Law and regulations risk	7
Governments regulations and laws	7
3B. Contracts risk	1
Long term versus short term contracts	1
4.FINANCIAL RISK	
Capital cost for product's life cycle based on convincing data	3
Product Price uncertainty	2
Financial strength of customers	1
Sales perspectives not being realistic	1
Not knowledge of pricing sensitivity	1
Non adequate investments to secure safety in production	1
Cash-to-cash cycle time Exposure	1
Decrease in net earnings from global sourcing due to the hidden costs	1
High switching cost	1
Accounting risk measures	1
Asset impairment risk	1
Downside risk associated with negative outcomes	1
5.COUNTRY RISK	
Economic crises, strikes	7
Regional instability	5
Political risk	5
Exchange rate risk	5
Cultural and ethics	4
Communication difficulties	1
6.REPUTATION RISK	
Public perception of the enterprise	4
New products don't fit with existing brand	1
Product don't contribute to brand name position	1
7.ENVIRONMENT RISK	
Natural disaster	9
Terrorist attack	7
Environment degradation and awareness	5
Accidents and safety issues	3
Theft	1
Diseases	1
High levels of CO_2 carbon emissions during the global sourcing activity	1

Table 3. Example of questionnaires for supply chain risk management

Risk Element	Present situation				...	Scenario n			
	S priority	P probab	I impact (M€)	VAR (M€)		S priority	P probab	I impact (M€)	VAR (M€)
Rate of product obsolescence	3	0.34	1.27	0,43		9	0.61	1.11	0,67
Operational disruption	2	0.46	1.67	0,76		8	0.12	2.12	0,25
Product and process design risk	3	-	-	-		3	-	-	-
...									

It is important to remark that this methodology is useful not only to decide to disaggregate the SC, it can help the enterprise to decide if reindustrialization would be a best choice and also to the government to a clear idea about the drivers that enterprises use to take this decision. In this way, Governments could act adequately to try to reduce risk in the country.

During risk assessment phase, VAR metric of each main source of risk will be calculated in order to facilitate the decision to managers. Thus, following this approach, all the costs that can appear after a strategic decision will be explicated and the overall impact on all the SC members will be taken into account.

5 Conclusions

This paper was intended to provide an overview of risks classification associated with Supply Chain strategic decisions and possible strategies that could be implemented by corporations to help managers take the best decision.

Authors argue that offshoring/outsourcing/reindustrialization decisions should not only be based upon the direct effect that these decisions have on an organization's profits. It is necessary to apply a Supply Chain Risk Management approach to take into account all risk components (strategic, operational, compliance, country…) because an indirect impact on other SC members can be as important as the direct one.

Authors FRC can be transformed into questionnaires to facilitate source risk identification phase of the SAM methodology. Thus, better understanding of different risk scenarios is possible. Assessment strategies were also discussed in this paper. It is proposed to use "Value At risk" (VAR) metric to calculate risk starting from probability and economic impact measurements of each element of risk. Decision costs are the best drivers to help managers to decide among reindustrialization, outsourcing or offshoring.

This theoretical proposal will be contrasted and extended in future investigations applying it to real supply chains.

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