SUPPLY CHAIN RISK MANAGEMENT (SCRM) IN THE
INDONESIAN MANUFACTURING COMPANIES:
SURVEY FROM MANAGER’S PERSPECTIVES

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ABSTRACT
In the context of Indonesian manufacturing companies, the implementation of supply chain risk management (SCRM) is considered relative immature, or in other words, it is still in the phase of initiation. This paper used exploratory study methodology to explore the phase of initiation in Indonesian manufacturing companies context. There are three main objectives of this paper. Firstly, is to confirm the urgency of needs of SCRM in the Indonesian manufacturing companies. Secondly, is to identify the practices of SCRM. Finally, it is to explore the source of supply chain risk. These three objectives were achieved through survey methods and interview semi-structured done with several operation managers. Findings from this research, indicate that most of questionnaires and interviewed managers believe that the implementation of SCRM is important to be implemented as it can reduce cost, reduce the lost of profit, and obtained fulfill order/demand within unpredictable condition after disruption. They also claimed that the information sharing, collaborative relationship and corporate social responsibility are the significant practices for SCRM implementation. Lastly, they stressed that the inbound and outbound sources of the risks need to be studied seriously as they can disrupt the operations of supply chain operation in the companies.

KEY WORDS
Supply Chain Risk Management, Indonesian Manufacturing Companies, and Manager’s Perspectives

1. Introduction

Last decades, when environment business change rapidly and accident of supply chain risk more happen, many companies lost financial and decrease customer service after supply chain disruptions. As a result, supply chain disruptions can increase cost [1] and the worst, can affect closure or bankrupt. There are many examples of company loss or bankrupt after the disruptions in supply chain. For example, Ericsson lost 400 million Euros after their suppliers of semiconductor plant caught on lightning hit a power line in Albuquerque New Mexico in 2000 [2]. New United Motors Manufacturing plant in Fremont city closed after the labour strikes that shut down 29 ports on the West coast of the US in October 2002 [3]. The recent example is Apple, which has lost many customer orders during a supply disruption of DRAM chips after Taiwan’s earthquake in 1999 [4]. Many supply chain scholars believed that companies can only mitigate supply chain risk but loss and damage could not be avoided when accident will happen. Therefore, supply chain risk management (SCRM) has become an effectively to reduce loss and damage such as: reduce cost and lost profit after supply chain disruptions [5; 3].

Development of SCRM begins in 1999 [6]. There is many evidences show that companies implemented SCRM have succeeded to mitigate supply chain disruptions such as: Ericsson [7], and Nokia [2]. However, in the context of Indonesian manufacturing companies, few companies have been implemented the concept of SCRM even though Indonesia is one of the countries that often exposed the catastrophic disruptions (e.g., earthquakes, economic crisis, SARS, bird flu, terrorists attack, industrial disaster), network risks (e.g., poor quality, shutting down electrical), and organization risks (e.g., labour strike, machines failure).

These disruptions can affect the effectiveness of supply chain operations in Indonesian company. As a consequence, the impact of supply chain disruptions can have significant on a firm’s short-term performance. For instance, industrial companies loss nine trillion ruppiah after the accidents of Yogya-Central Java earthquakes [8; 9]. On top of this, supply chain disruptions can have long-term negative on a financial performance. Adiningsih and Tim Penilai Gabungan [10; 8] claimed that many small and medium companies have lost significant profit after Yogya-Central Java earthquakes.
Many companies in producing material or finished good also suffer from the supply chain disruptions that resulted from the non-natural disaster (e.g., Shutting down electrical, violate demand, supplier bankrupts). For example, PT Goodyear Indonesia (Tbk) losses Rupiah of 750 million per day and is expected to loss 2.500 ban. PT Semen Cibinong (Tbk) and other company (especially Small Medium Enterprise (SME) scale) are not produce after shutting down electrical in Bogor [11]. At least 50.000 SME’s Sumatera Utara loss production approximately 60% per day and suffer a financial loss Rupiah 4,000 million per day after shutting down electrical [12].

The manufacturing.net has conducted a research that indicates a rising number of companies are going to be investing more in SCRM processes over the next year. According to an AMR Research report this month, 46 percent of firm’s surveyed plan to implement or evaluate SCRM technology in the next 12 to 24 months, and 54 percent plan to increase their SCRM budgets over the next 12 months [13].

Therefore, the implementation of SCRM is also very important for the Indonesian manufacturing companies. However, the implementation of SCRM in Indonesia is relatively new as it is only in the phase of immature or initiation. Until now, there is no much previous empirical study explored supply chain risk management in Indonesian context, especially Indonesian manufacturing companies. This paper used exploratory study because little information (e.g., journal articles) that discuss supply chain risk management issue in Indonesia.

This paper is proved from the interviews done with the managers before the study is conducted. This study is only to focus the phenomena of SCRM in initiation phase. There are three purposes of this paper. First, is to explore the manager’s believes among Indonesian company on the urgency and importance of SCRM whether supply chain risk management can reduce disruption or not. Second, is to investigate the practices of supply chain risk management. Finally, is to identify and map the source of inbound supply chain risk.

2. Supply Chain Risk Management (SCRM)

It is widely accepted that the supply chain management is defined as “the management of material, information and financial flows through a network of organizations (i.e., suppliers, manufacturers, logistics providers, wholesalers/distributors, retailers) that aims to produce and deliver products or services for the consumers. It includes the coordination and collaboration of processes and activities across different functions such as marketing, sales, production, product design, procurement, logistics, finance, and information technology within the network of organizations” [14].

However, many recent events have demonstrated that an event affecting one company or process in a supply chain may interrupt the continuity of operations of other members of the supply chain. As a consequence, the issue on SCRM is considered new and while the concept is new, it has been gaining more attention lately, as it aims to help companies to overcome of a natural disaster that would interrupt the companies. Christopher [15] has defined SCRM as “the management of supply chain risks through coordination or collaboration among the supply chain partners so as to ensure profitability and continuity”.

SCRM comprise the set of systems and processes used to manage supply chain disruptions. Disruptions are defined as major breakdowns in the production or distribution nodes that comprise a supply chain. These may include events such as a fire, a machine breakdown, an unexpected surge in capacity that creates a bottleneck, quality problems, natural disasters, customs delays, or any other number of different problems.

As mentioned in the previous paragraph, the companies need management practices and strategy to mitigate supply chain risk. The successful companies would be those that can identify, assess, and develop contingency plans for sources of supply chain risks that exits internally and externally to the organization [15]. Supply chain risk is about any threat of interruption to the workings of the supply chain. Risk may be generated as a result of risk ‘drivers’ that are either internal or external to the company. Tang et al [3] believe that effective SCRM can reduce cost and loss profit when the company suffers supply chain disruption. Faisal et al [5] suggest that SCRM can fulfill demand although occur supply chain disruptions.

Many companies in United States and West Countries have implemented SCRM to mitigate the supply chain risk. Many researches have been conducted in regards with the SCRM implementation but they were mainly surveys done in the United States and West Countries. An SCRM study in the Asian countries context, in particularly, Indonesian context is rather none. This is due to the fact, that there are only few companies implementing SCRM, and therefore, not many researches have been done on this area. This is opposite with the situation in United States and West Countries, in which, SCRM implementation is relative mature among companies.

As mentioned earlier that Indonesian companies is only in the initiation phase for the implementation of SCRM, therefore, it is important to investigate the manager’s
believes’ about level urgency and whether SCRM can help to reduce the risk in supply chain. As the managers’ beliefs on the potential for SCRM to give better improvement are likely to rise, this paper, investigates whether the rise of the beliefs on SCRM is happening among the Indonesian companies.

2.1 Sources of Inbound Supply Chain Risk

Juttner et al [16] divided the source of supply chain risk into three categories: environmental risk sources, network-related risk sources, and organizational risk sources. The disruptions impacts of these three sources of supply chain risk are different. Christopher and Peck [17] (2004) divided detail the network risk sources into two categories: supply-side and demand-side risk sources. Whereas organization risk sources are also differentiated into two categories: process and control risk sources. According to its sources, these Supply chain risks are divided into the risk classes, as it is defined bellowed in the figure 1.

Sources: Christopher and Peck, 2004 [17]

**Figure 1:** The Source of Supply Chain Risk

From the figure above, it indicates that all the entities of supply chain will be disrupted if the environmental risk source is happened. The organization risk also known as control risk could impact the demand side and supply side. It is obvious that the sources of supply chain risk are many and complex. In assessing the risk of a supply chain, companies often undervalue the element and complexity of risk. This is due to the fact that the supply chain disruptions can arise from external sources - such as a natural disaster or internal sources such as a failure to integrate all functions in a supply chain. Disruptions can also result from attempts to create a more efficient, cost-conscious supply chain environment [18, 19].

Internal sources or inbound supply risk is defined as “the potential occurrence of an incident associated with inbound supply from individual supplier failures or the supply market, in which its outcomes result in the inability of the purchasing firm to meet customer demand or cause threats to customer life and safety” [18]. Zsidisin and Ellram [20] argue that a supplier’s failure to deliver inbound goods and services can have detrimental effect. Consequently, it is important for the organizations to identify and assess the sources of inbound supply chain risks.

Zsidisin [21] indicated that supply market condition and supplier characteristic were very important to managerial perceptions of inbound supply chain risks. The types of sources of market in inbound supply chain include global sourcing, market capacity constraints, market price increases, and number of qualified suppliers. The types of sources of supplier in inbound supply chain risk include capacity constraints, inability to reduce cost, incompatible information systems, quality problems, unpredictable cycle times, and volume and mix requirement changes.

2.2 Mapping sources of inbound supply chain risks

Supply chain risk assessment is an important stage in the supply chain risk management process. The operations manager must identify and assess not only direct operations of supply chain risk, but also the potential sources of supply chain risk at every significant link along the supply chain [22]. Norrman and Jansson [7] suggest that supply chain risk identification and assessment is compulsory for the companies in order to recognize future uncertainties to enable proactive management of supply chain risk.

After the operations managers identify sources of supply chain risks, the operations manager must continue to assess and prioritize these sources. The supply chain risk map is one important tool to assess and prioritize sources of supply chain risks. This tool is to compare sources of supply chain risks by assessing their probabilities and impacts and put them in a supply chain risks map. In the process of mapping the sources of supply chain risks, the probability and impact can be classified as high, medium, and low (figure 2) Norrman and Jansson, [7]. Hallikas et al [23] describe that assessing could be quite a straightforward and quantitative task, but also could be a subjective process.
Risk is “combines a probabilistic measure of the occurrence of the primary event(s) with a measure of the consequences of that/those event(s)” [24]. This “quantitative definition” could be expressed: Risk = Probability (of the event) * Business Impact of the event. Therefore, the prioritization of sources of supply chain risk is primarily based on quantitative definition of risk.

2.3 Supply Chain Risk Management Practices

Some of the practices identified from the literature review in regards with SCRM that enable risk mitigation are information sharing, collaborative relationship, and corporate social responsibility. Thus, the companies need to implement the practices to mitigate the supply chain risks after supply chain disruptions. In this paper, the discussions of the practices are mainly on these three practices.

Many researchers believed that information sharing is one of the important practices for SCRM if the companies want to manage risk of supply chain in their organizations. Chopra and Sodhi [2] argued that the increment of the visibility of demand information across supply chain reduces the risks. Therefore, information sharing is vital for supply chain as lack of information lead to panic, chaotic behavior and unnecessary costs [25]. Free exchanges of information which starts with the product development stage and continue with the mature and end-of-life phases of the product life cycle has been found to be highly effective in reducing the risks associated with inventories, obsolescence and supplier failure [26].

Whereas, collaborative relationship and trust among supply chain partners are another practices for SCRM. In order to manage the risk effectively in a supply chain, organizations are moving to adopt closer relationship with key supplier [27]. Collaborative relationships require trust and commitment for long-term cooperation along with a willingness to share risks [28]. Many companies managed to reduce risk through the collaborative relationship and trust among supply chain risk partners. For example, Walmart, Proctor and Gamble, Lucent Technologies, and Sara Lee now collaborative readily with their supply chain partners in the areas of planning, forecasting and replenishment that help in reducing risks [29; 30].

Lastly, many experts suggest that one possible way of anticipate challenges under risk and uncertainty can be addressed by corporate responsibility [31; 32; 33]. Corporate social responsibility used by many company to reach their market positioning is critical or counter the risk of disruptions to mitigate negative publicity and earnings impact for company. Bowersox [34] believed that, “the logistical mission of yesterday is being replaced by a broader concept driven by social responsibility”. In this paper, these three practices for SCRM were explored in the context of Indonesian manufacturing companies.

3. Research Methodologies

This study used survey methods through questionnaires and semi-structured interviews. Questionnaires were sent to the respondents through mail and email. Database e-mail is gathered from two sources: the Indonesia Production and Operations Management Society (IPOMS), Asosiasi Logistik Indonesia (ALI) and first Operations Supply Chain Management (1st OSCM) conference at Bali in 2005. The focus of this study is manufacturer and dyadic supplier-manufacturer relationship in Indonesian manufacturing companies, especially big and medium enterprise. Therefore, the units of analysis of this research are purchasing, production, and supply chain managers because those daily are under domain of this research.

The questionnaire was developed and tested. 150 questionnaires were distributed to the Indonesian manufacturing companies related to food and beverages industries, wood product and furniture industries, textiles and clothing industries, electronics industries, paper and printing product industries, chemical, petroleum and plastics industries, metal and machines product industries, and other manufactured products. Positive and negative statement is used to simply the validation of questionnaire. The survey sent the questionnaire via e-mail to the targeted respondents. The returned/replied questionnaire, 30 were usable, representing a response rate of approximately 20 %.
Descriptive analysis is used to analyse the profile of the companies and respondents. The responses were mainly from the purchasing managers (39 percent), 35 percent are supply chain manager, and 26 percent of the respondents are others. The responses also shows that type of industry are mostly from the food, beverage, and cigarette (22 per cent), textile, wearing apparel, and leather products (13 per cent), wood products, and furniture (4 % per cent), electronic (30 per cent), and industrial chemicals, coal products, petroleum refineries, plastic products, and rubber products (17 per cent), Iron and steel, and non-ferrous metals (4 per cent), and other manufactured products (30 per cent). In the following section, survey results are presented.

4. Survey Results and Analysis

The respondents were asked to rate the urgency of supply chain risk management (SCRM) on a four-point scale from “very disagree”, “disagree”, “agree” to “very agree”. Positive and negative questions were used to validate the questionnaire. Figure 3 shows that most of the managers of Indonesian manufacturing companies believe that SCRM is important to fulfill demand, reduce high cost, and reduce loss profit if the companies suffer supply chain disruptions. It can be concluded that those companies aware on the benefits of the SCRM implementation. If the company implement the SCRM, the managers believed that their respective company would fulfill the demand although a disruption of supply chain risk occurs. This is shows by the highest percentage of agree and very agree with the statement in which, very agree (29%), agree (58%), and only 18% respondent answered disagree. For reducing the cost, 35% indicates they very agree with the statement, agree (53%), and only 12% respondents were disagree. Most of the managers answered not sure the impact on the loss profit. This is shows by very disagree (24%), disagree (65%), and agree (12%). On the other hand, most of the managers disagree that they have to develop the risk assessment and contingency plan program (very disagree (47%) and disagree (53%)). This concludes that managers believed that that their companies could reduce the loss in profit if the SCRM is implemented and develop the risk assessment and contingency plan program. This result also described that Indonesian manufacturing managers needs implementation supply chain risk management in own company because many supply chain risk sources more happen in Indonesia.

The survey also indicates that most of the managers have knowledge on the SCRM issues (very know (28%); know (67%), only 6 respondent answer don’t know. In addition, the managers have been trained about SCRM (ever (50%), no ever (50%). As a consequence, they also have developed metrics (often (56%), little (38%), and never (6%)) and the assessment of supply chain risk (always (6%), often (82%), little (6%), and never (6%). Managers often executed risk assessment and contingency plan program (always (11%), often (44%), little (44%)). Detail percentage of the result of preliminary research for ability of SCRM can see in figure 4.

Based on interview in-depth, the manager knew and learned the supply chain risk management issues from Internet and self-study. He also participated in training that only explains slightly supply chain risk management issues. Least training of supply chain risk management is conducted by the academicians or training consultant. In fact, the scholars and practitioners slightly published supply chain risk articles in national journal, magazine, and newsletters. Therefore, many opportunities to create supply chain risk management training by the academicians and training consultant. The Indonesian scholars can more interests to studies catastrophic risk in
the future research because those risks more happen in Indonesia. Sheffi, [35] believed the catastrophic risks are currently topical attention in the future.

The results in Table 1 show the prioritization of sources of inbound supply chain risk based on quantitative definition of risk and the map of sources of inbound supply chain risks. Frequency and impact scale used Likert scale (five-point scale) in order to easy respondent differentiated supply chain risk sources. The respondents were asked to rate the frequency of inbound supply chain risk sources on a five-point scale from “no (1)”, “rarely (2)”, “sometimes (3)”, “often (4)”, and “very probable (5)”. The choice answer in impact also used five-point scale from “No impact (1)”, “low impact (2)”, “medium impact (3)”, “serious impact (4)”, and “tragic impact (5)”. As can be seen from table 1 and figure 4, quality is highest type of inbound supply chain risks sources. Its means the most respondent that work in operations management area (purchasing, production, and distribution/supply chain) believed that quality problem is often frequency (4.00) and serious impact (4.14) for Indonesian manufacturing companies. The inability of main supplier to conform to requirement quality specification cause quality is high disruptions in supply chain.

Managers of Indonesian manufacturing companies suggest that market price increases (rank: 2, coordinate: 3.65; 4.04), Process technological changes (3, 3.70; 3.96), and Legal liabilities (4, 3.64; 3.68) in influencing the supply chain disruption in Indonesia. Although, natural disasters more happen in Indonesia, managers of Indonesian manufacturing companies believe that the disasters are not main sources of disruption in the companies. The result is may be “surprise” and different if this research is conducted after Jabodebeka floods on February 2007. The main location of respondents is in Jabodateka. Other on hand, the quality problems is main activities and always is acted “day by day” in companies than disaster that unpredictable and beginning from external uncertainties. Detail others type of sources of inbound supply chain risk is shown in table 1 and figure 5.

The purposes of this paper also investigate the practices of supply chain risk management. The interviews semi-structured by email and face-to face were investigated supply chain risk management practices in Indonesian manufacturing companies. The position of respondent is at operations manager as two-supply chain manager, one senior EXIM (Export Import), logistics & procurement manager, and one purchasing/resource manager.

The fourth Indonesian manufacturing operation managers also believed that information sharing, collaborative relationship among supply chain partners, and corporate social responsibility are significant factors of supply chain risk management practices to reduce disruptions of supply chain risk. By interviews, SW (Supply chain manager of PT PG) and AS (Senior exim, logistic & procurement manager of PT SI) believed knowledge and skill of manager is significant factors to make effectiveness of supply chain risk management to mitigate risk of supply chain. Therefore, knowledge and skill of operation manager is considered as factor of supply chain risk management practice.

Table 1: The Prioritization Sources of Inbound Supply Chain Risk in Indonesian Manufacturing Companies

<table>
<thead>
<tr>
<th>Rank</th>
<th>Type of sources of Inbound Supply Chain Risk</th>
<th>Frequency</th>
<th>Impact</th>
<th>Value of risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Quality</td>
<td>4.00</td>
<td>4.14</td>
<td>16.55</td>
</tr>
<tr>
<td>2</td>
<td>Market price increases</td>
<td>3.65</td>
<td>4.04</td>
<td>14.77</td>
</tr>
<tr>
<td>3</td>
<td>Process technological changes</td>
<td>3.70</td>
<td>3.96</td>
<td>14.62</td>
</tr>
<tr>
<td>4</td>
<td>Legal liabilities</td>
<td>3.64</td>
<td>3.68</td>
<td>13.39</td>
</tr>
<tr>
<td>5</td>
<td>Inventory management</td>
<td>3.45</td>
<td>3.73</td>
<td>12.88</td>
</tr>
<tr>
<td>6</td>
<td>Information system compatibility and sophistication</td>
<td>3.41</td>
<td>3.73</td>
<td>12.71</td>
</tr>
<tr>
<td>7</td>
<td>Management vision</td>
<td>3.41</td>
<td>3.50</td>
<td>11.93</td>
</tr>
<tr>
<td>8</td>
<td>Inbound transportation</td>
<td>3.39</td>
<td>3.48</td>
<td>11.80</td>
</tr>
<tr>
<td>9</td>
<td>Supply availability</td>
<td>3.00</td>
<td>3.82</td>
<td>11.45</td>
</tr>
<tr>
<td>10</td>
<td>Financial health of supplies</td>
<td>3.14</td>
<td>3.67</td>
<td>11.52</td>
</tr>
<tr>
<td>11</td>
<td>Purchase cycle time</td>
<td>2.87</td>
<td>3.61</td>
<td>10.36</td>
</tr>
<tr>
<td>12</td>
<td>Cost reduction capabilities changes</td>
<td>2.91</td>
<td>3.26</td>
<td>9.50</td>
</tr>
<tr>
<td>13</td>
<td>Volume and mix requirements changes</td>
<td>2.64</td>
<td>3.50</td>
<td>9.23</td>
</tr>
<tr>
<td>14</td>
<td>Shipment quantity inaccuracies</td>
<td>2.45</td>
<td>3.50</td>
<td>8.59</td>
</tr>
<tr>
<td>15</td>
<td>Environmental performance</td>
<td>2.32</td>
<td>3.59</td>
<td>8.32</td>
</tr>
<tr>
<td>16</td>
<td>Supplier capacity constraints</td>
<td>2.35</td>
<td>3.26</td>
<td>7.66</td>
</tr>
<tr>
<td>17</td>
<td>Number of available suppliers</td>
<td>2.24</td>
<td>3.00</td>
<td>6.71</td>
</tr>
<tr>
<td>18</td>
<td>Shipment quantity inaccuracies</td>
<td>2.45</td>
<td>3.50</td>
<td>6.20</td>
</tr>
<tr>
<td>19</td>
<td>Disasters</td>
<td>1.39</td>
<td>3.04</td>
<td>4.23</td>
</tr>
</tbody>
</table>

Figure 5: Mapping sources of Inbound Supply Chain Risks
5. Conclusion

This paper explains that Indonesian manufacturing companies need to start realize the importance of SCRM implementation. To conclude, implementation of supply chain risk management is relative immature, but the ability managers of supply chain risk management relatively good to support supply chain risk management implementation. Most of the respondents suggest the quality is sources of inbound supply chain risk that high probability and impact in Indonesian manufacturing companies. Although natural disaster more happen in Indonesia, most respondents argue natural disaster slightly probability and impact to disrupts in Indonesian manufacturing companies. The Indonesian scholars relative less to study in supply chain risk area. The presence of this exploratory study research result can contribute to explore how the urgency and importance of SCRM and the ability of SCRM knowledge. The limitations of this study are the total sample size is rather small. In order to obtain more reliable results, it should require a large-size sample. Perhaps, even more important would wish to use more powerful statistical analysis. In the future research, researchers and managers could stress that the inbound and outbound sources of the risks need to be studied seriously as they can disrupt the operations of supply chain operations in the companies.

Reference


