

## Urgency in Managing the Risk in Supply Chain Amongst Indonesian Manufacturing Companies

<sup>1</sup>Iwan Vanany and <sup>2</sup>Suhaiza Zailani

<sup>1</sup>Department of Industrial Engineering,

Sepuluh Nopember Institute of Technology, Surabaya, Indonesia

<sup>2</sup>School of Management, University of Sains Malaysia, 11800 Penang, Malaysia

---

**Abstract:** This study is an attempt to highlight steps to be taken by business organizations through supply chain risks management to make sustainable development a reality. This study is based on the exploratory study done to investigate the importance of supply chain risks management. The survey data was obtained from 10 manufacturing firms in Indonesia. The survey was conducted using structured interviews directed to the supply chain representative in each firm. The results indicate that most of the managers admitted that their respective companies could not fulfill the demand if disruption of supply chain risk occurs and therefore, it is necessary to manage the risks by developing supply chain risk strategies. In addition to this, companies should develop strategies that can mitigate the impact of these risks. Supply chain risks management, therefore can play significant role in achieving the triple bottom line of social, environmental and economic benefits and therefore, contributing to sustainable development of the society.

**Key words:** Supply chain risks management initiatives, adoptions, Indonesian manufacturing companies, exploratory, disruption, strategies

---

### INTRODUCTION

Many organizations are continually faced with new or change uncertainties because of trend and developments in supply chain. Such uncertainties are due to the developments such as integration and outsourcing, concentration and globalization, more demanding customers, dependency on ICT and E. commerce and legislation. This is supported by Brindley (2004) who suggests that global competition, technological change and the continuous search for competitive advantage are the primary factors that could influence at any point in the supply chain.

The consequences of these developments and competitive supply chains clearly signal a potential increase in both uncertainty and risk. Accordingly, the increasing in complexity of structures, strategies and systems are rapidly emerged in response to the new competitive challenges; hence, provide further sources of uncertainty and risk. However, the identified sources of uncertainty and risk cover every stage in the supply chain and not just the final stage of the product/service delivery to the customer (Ritchie and Brindley, 2001).

Uncertainty and risk can seriously disrupt or delay the flow of material, information and cash through an

organization's supply chain. Disruptions to material, information and cash flows anywhere in the supply chain are unpredictable and rare but often quite damaging. Thus, to avoid lost sales and increased costs from the supply-chain breakdown and to ensure that organization performance stands a better chance of being improved from these uncertainties and risks, many organizations are now turning towards risk management approaches.

According to Giannakis *et al.* (2004), risk management is emerging as an important contributor to most fields of management decision and control especially in the Supply Chain Management (SCM) field. However, risk management within supply chains is one of the most significant challenges facing every organization by the fact that all organizations are a member of at least one and more probably, multiple supply chains.

Giannakis *et al.* (2004) further defined risk in supply as an uncertainty or unpredictable event affecting one or more of the parties in the supply chain or its business setting that can influence the achievement of the performance. For instance, in the last few years when such international events as 11 September, the war in Iraq and the west coast port workers strike have brought supply chain operations to a standstill. Other less serious risks that can also impact customer service that describe

by include natural disasters, fire and theft, poor communication of customer requirements, part shortages, poor and quality problems. Following this, Christopher and Lee (2004) recognize the increasing these risks in the supply chain context and the need for new responses to manage these risks.

Thus, business strategies often incorporate contingency plans for managing risks so that any disruption in material, information and financial flows can be properly managed in the chain. It is now becoming increasingly accepted that the traditional SCM approaches must be enhanced to include the new uncertainties.

New approach of supply chains requires companies to move towards more complex environment in which many parallel physical and information flows occurring in order to ensure that products are delivered in the right quantities, to the right place in a cost-effective manner. Consequently, the efficient method in managing risks in supply chain during recent years has resulted in the supply chains becoming more vulnerable to disruption (Christopher and Lee, 2004).

Hence, Supply Chain Risk Management (SCRM) represents a new approach in supply chain with a greater focus in managing the unpredictable and uncertainties events. Following this, the aim of this study is the examinations of the issues of increasing uncertainty and risk in the context of supply chain. In essence, this study is interested to examine the new approach of SCM which focuses on SCRM.

This study seeks to establish some key discussions on the importance of supply chain risk management. It started by addressing the historical experiences of international companies in managing risks in their supply chain. Secondly, the Indonesian companies historical accounts of experiences are discussed. Methodology through interviews done with managers in the selected companies in Indonesia is discussed.

## **Literature review**

### **Managing risk in supply chain-an international context:**

According to Christopher (2003), the increased competition in business environment motivates organizations to improve efficiencies and anticipate uncertainties in their supply chain. Therefore, many companies have restructured their organizations especially between the chain partners. Supply chain has gained its importance recently due to its ability to reduce costs and increasing responsiveness in the chain (Childerhouse *et al.*, 2003; Li *et al.*, 2006). Concerning supply chain, many researchers have given many definitions on supply chain. Among the popular one

would be by Lee and Whang (2000) which stressed that the supply chain encompasses all organizations and activities associated with the flow and transformation of goods from the raw materials stage through to the end user as well as the associated information flows.

In other words, supply chain is the integration of key business processes from end user through original suppliers to add value and services to customer and stakeholders.

The definition of Supply Chain Management (SCM) that could be also stated here would be by Handfield and Nichols (2002) that SCM is the integration of activities through improved supply chain relationship to achieve sustainable advantage. SCM is also the management of supply chain organizations through cooperative organizational relationships, effective business processes and high levels of information sharing to create high-performing value systems that provide member organizations a sustainable competitive advantage.

It is widely accepted in the literature that SCM is important for material and information flows relating to the transformation of the materials into value added products and the delivery of the finished products through appropriate channels to customers and markets to maximize customer value and satisfaction.

The successful implementation of SCM has been proven by many giant companies such as United Colors of Benetton (Smichi-Levi and Kaminsky, 2000), Kurt Salmon Associates Inc. (Lummus and Vokurka, 1999), Hewlett-Packard (Hammel and Kopeczak, 1993) and Wal-Mart (Johnson and Davis, 1995).

In regards with risk, it is often originated from the lack of knowledge about the events that may affect the results (performance) of a system and the ability to tackle them. The concept of risk is most commonly conceived as reflecting variation in the distribution of possible outcomes, their likelihood's and their subjective values (March and Sharpira, 1987). Typically, risk is characterized by both the probability of an event and its severity given that an event occurs.

However, they have pointed out that risks or disruptions in the supply chain are not only increasing in frequency but the severity of their impact to the performances in the chain can be costly and potentially bring portions of the chain to a complete halt (March and Sharpira, 1987).

Risk management concepts have been around for several years, however they have generally been bounded to the financial area (Chapman, 2006). Lately, risk management has a broader scope than that of a financial area. Today, according to common experience and evidences, risk management is assuming to be a critical

role in the supply chain which has disrupted supply chain operations repeatedly. The approach in managing risks from a supply chain perspective provides insights regarding how the key processes have to be performed across the chain. Chen and Paulhaj highlighted that the anticipation of uncertainties or risk in operations supply chain is very significant factors in influencing supply chain performance. For example, Lee and Whang (2000) point to some of the consequences of supply chain disruptions (whether caused by security-related causes or other reasons) including increased cost, delivery disruption, interruptions in the smooth flow of product and service, time delays, uncertainty as to quantity, quality and timely arrival, traffic and port congestion and longer cycle times.

Further, indirect consequences can include lower service levels which could affect long-term customer relations and higher insurance premiums due to security and other risks of supply chain disruption. Hendricks and Singhal (2005) found that supply chain disruptions such as manufacturing delays, supplier failure, quality problems and internal errors, led to firm under-performance in the stock market as well as in operational performance.

They cite reductions in operating income, return on sales, return on assets and sales growth as consequences of supply chain disruptions while also noting increased costs and inventories. Such performance shortfalls were observed to last as long as 2 years after the initial disruption.

These consequences point to the real cost of disruptions, including those caused by security-related causes and suggest that the costs of safeguarding against security problems should be balanced against the gains from avoiding disruptions, the gains from improved customer relations and lower insurance premiums and the gains from avoiding outcomes such as deteriorating supply chain performance.

As the performance and risk are interconnected, therefore organizations require deliberate tools and controls to maximize performance while controlling the consequential risks (Lonsdale and Cox, 1998). In other words, risk in supply chain can disrupt supply chain operations and consequently can have significant impact on a firm's short-term and long-term performances.

As many manufacturing organizations continue to outsource the materials, the rise of supply chain disruptions increases significantly. Thus, the detrimental effects of uncertainties in a business environment could disrupt the operation of supply chain partners in the supply chain. There were several events such as earthquake in Kobe in 1995, terrorist attack to WTC in

2001, SARS in 2002-2003 where risk becomes most damaging for a company and its chain. For example, the Kobe earthquake killed >6,400 people, destroyed 100,000 buildings, closed Japan's largest port for two months and caused >US\$100 billion in damages (Bosman, 2006).

Consequently, among the companies forced to scramble for alternate production and transportation were several of the world's major auto manufacturers. Toyota alone was unable to produce 20,000 cars on schedule after damage to plants left it short of critical components. Following this, Faisal *et al.* (2006) and Tang (2006) believed that effective risk management has become a potential strategy to mitigate uncertainties and risk in supply chain.

As mentioned before that managing risks among the members of the chain, particularly between buyer and supplier will result on the big impact to the partnership in term of the business performance.

Although, supply chain disruptions can have significant impact on an organization's performance among members a of supply chain however, many studies have shown that most organizations are not adequately prepared to manage supply chain risks (Juttner, 2005). Consequently, more attention has been paid to the question of how well companies in the chain are prepared to managing risk in supply chain. In regards with this, the Marsh survey found that 40% of respondents were not prepared for a terrorism attack while only 28% were prepared for a natural disaster that could destroy their supply and business operations.

In addition, it is surprising that the Marsh survey found only 24% of respondents felt they were adequately prepared to manage a terrorism crisis if one occurred, 36% did not think they were vulnerable while another 36% did not know.

With large multi-national companies being targets for terrorist attacks, not only from extremists but also from groups such as anti-globalization movements, the risks associated with operating in an area with less security should be given more attention and consideration. Another studies suggest that only between 5 and 25% of Fortune 500 companies are prepared to handle crises or disruptions (Mitroff and Alpasan, 2003) and that a \$50-100 million cost impact can be incurred for each day if a company's supply chain network is disrupted.

Stock market reaction to supply chain disruptions have also been shown to be significant to companies who have announced major supply chain problems in which their shareholder value drop by 10.28% on average with an average recovery time of 50 trading days (Hendricks and Singhal, 2003). There are many types

of risks that can affect the performance of supply chain for example, earthquakes, economic crises, SARS, labor strikes, terrorist attacks, uncertain economic cycles and unpredictable natural and man-made disasters. Besides these risks, the short-term supply chain disruptions such as when the supplies are needed but not available also need to give attention (Hendricks and Singhal, 2003; Juttner, 2005).

Examples of these short term disruptions are Sony's inability to deliver Playstation 2's for the 2000 holiday season due to part shortages and Nike's inability in 2001 to match demand with supply due to complications in implementing SCM systems (Hendricks and Singhal, 2003). These types of disruptions form an inherent risk in a supply chain and the management of that risk is important to all members of the supply chain as the affects from a serious disruption can filter through many members of the supply chain (Juttner, 2005).

In conjunction with this, supply chain disruptions can have long-term negative effects on a firm's financial performance. For example, in the case of Daimler Chrysler, McGillivray (2000) explains that there was hurricane which flooded a plant producing suspension parts in Greenville, North Carolina. Consequently, seven of the company's other plants across North America had to be shut down for seven days resulted from the hurricane.

Similarly, Toyota was forced to shut down 20 of its 40 assembly lines for 6 weeks following a fire at its brake-fluid proportioning valve supplier (Nelson *et al.*, 1998). The costs caused by the disruption were an estimated \$40 million per day. The insolvency of chassis manufacturer UPF Thompson happened in the UK at the end of 2001 had sudden and serious impacts upon its major customer, Land Rover which faced the possibility of having to suspend production of the discovery (Jennings, 2002). More recently, the ten-day shutdown of ports in the US is reputed to have cost the US economy \$1 billion a day.

Moreover, because vulnerable Japanese car manufacturers such as Toyota and Nissan had to halt production, business analysts have predicted that East Asia would have slipped into a recession had the dispute gone on for any length of time. A more evident fact is based on Ericsson lost 400 million Euros after their supplier's semiconductor plant caught on fire in 2000. In 1999 in Taiwan, Apple has lost \$2.2 million during a supply shortage of DRAM chips after an earthquake hit the country. The above examples demonstrate clearly that a disruption affecting a firm's financial performance. Obviously, this can have a direct effect on a corporation's ability to continue operations, get finished goods to

market or provide critical services to customers. Hendricks and Singhal (2005) highlighted this scenario in their report that companies suffering from supply chain disruptions experienced 33-40% lower stock returns relative to their industry benchmarks. Supply chain disruptions have also been found to negatively impact shareholder value by as much as 8-10%. Following this, Deloitte in its risk management study of Dismantling the Value Killers found that many of the greatest market capitalization losses in the world were attributable to supply chain disruptions that were considered extremely unlikely and those companies seemingly failed to plan.

Many of the companies that investigated in the study lost >20% of their market value in the month after the disruptions and it often took more than a year before their shares regained their original levels. Apart from Deloitte's study, the Department of Homeland Security US has experienced an increasing incidence of stowaways and contraband in containers. With the focus of law enforcement on security, there has also been a rapid increase in the extent of organized retail theft.

Another example is the case of the New United Motors Manufacturing plant in Fremont city, in which has shut down their 29 ports in the West coast of the US in October 2002 after the labor strikes (Sarkar *et al.*, 2002). Therefore, it can be concluded that the cost and expense associated with these occurrences can result in major losses to a company. It is believed that risk is seen to play a negative role in the growth of business performance because the literature has proved that a risk positively affects the disruptions in supply.

Mentzer *et al.* (2001) stressed that a supply chain comprises of 3 entities: a company, a supplier and a customer directly involved in the upstream and downstream flows of products, services, finances and information. Following this, risk in the supply chain mainly refers to the disruption of flows for information, materials, products and money between these organizations.

Therefore, any approach to managing risks from a supply chain perspective must not refer to a single organization but must provide insights regarding how the key processes have to be performed across at least 3 organizations. An evident fact is based on the case of Nokia (the cell phone manufacturer). A major supplier to Nokia is Phillips which produces the major semiconductors for Nokia phones at its plant in Albuquerque, New Mexico. This plant, however was caught by fire after a line of thunderstorms rolled through the city of Albuquerque on March 17th, 2000. Although, the fire was put out in <10 min by the sprinkler system but

the smoke had spread throughout the facility. This resulted in the contamination of wafers in almost every stage of production and destroying millions of cellphones worth of chips in those few minutes. It was believed that the fire affected the production of some 4 million handsets. Unfortunately, Nokia was about to roll out a new generation of cell phones that depended on the chips from the infirm Phillips lab. As a consequence, >5% of the Nokia's annual production was disrupted during a time of booming cell phone sales (Wall Street Journal).

Accordingly, Erickson as other cell phone manufacturers also was sourcing from Phillips and when Ericsson turned to other suppliers; they realized they didn't have alternate suppliers available for the chips that came from the plant. The end result was that Ericsson bore the brunt of the disruption and came up millions of chips short of what it needed for a key new generation of cell phone product. That shortage of millions of chips meant a shortage of millions of high-end handsets, with the resulting wrong product mix for the fast-moving cell phone market.

At the end of the first disruption-impacted quarter, Ericsson reported losses of US\$340 and 450 million before taxes which led to a nine-month recovery time. At the end of 2000, Ericsson announced a staggering US\$1.68 billion loss in the company's mobile phone division (Wall Street Journal). Two dramatically different outcomes from one event of risk, demonstrate the importance of managing disruptions in supply chain (Chopra and Sodhi, 2004).

One of the major lessons to be learned from supply chain disruptions is that the speed of a company's response to a disaster is critical. Elkington (2006), vice-president of Marsh's Risk Consulting Practice concluded to manage supply chain risks in Asia, businesses need to map their risk exposure, identify and priorities the major issues, run in-depth analysis and programme implementation and finally monitor and control the process.

Elkington (2006) indicated that the risks will always present and the crises will occur but with solid contingency planning and Supply Chain Risk Management (SCRM), the companies can minimize the negative impacts and manage these situations more effectively. In other words, companies who have already established plans to manage the risks through implementation of SCRM will be able to recover more effectively and quickly mitigate the impact of these disruptions.

Formally, SCRM can be defined as the identification and management of risks for the supply chain to reduce supply chain vulnerability as a whole (Juttner, 2005). Following this, a detailed investigation of SCRM in the

development process of Indonesia is therefore called for. This present study investigates the implementation of the concept of SCRM in the context of Indonesian companies.

**Indonesians' experiences in risk:** Asia has experienced several large-scale natural disasters in the past few years, with the areas around eastern-China, India and Indonesia being the hardest hit. While these disasters can have a major impact on the physical side of a business (i.e., property damage, stock loss, unproductive workers and others), the disruption to the supply chain can often be the most destructive.

In the case of Indonesia, it is widely accepted that the role of the supply chain risks is important in influencing the business growth as Indonesia is one of the countries that is often exposed to disasters for example, earthquakes, economic crises, SARS, bird flu, terrorist attacks and short-term disasters (Pusponegoro, 2004). Disaster is a situation where the society fails to live normally due to extraordinary afflictions whether because of natural disaster or human doings (Sphere Project, 2000). Following is a list of some of the disasters that hit Indonesia since the tsunami of 2004:

- Dec. 26, 2004: Nearly 132,000 Indonesians are killed and >37,000 listed as missing after a 9.15 magnitude earthquake off Indonesia and a tsunami triggered by it in the Indian Ocean region. The toll in affected Indian Ocean countries reaches 230,000 dead
- Feb. 21, 2005: At least 96 are killed in landslide that sweeps through two West Java villages near a garbage dump
- March 28, 2005: Nearly 1,000 are believed killed after a quake of magnitude 8.7 hits the coast of Sumatra
- July 20, 2005: Indonesia confirms first deaths from bird flu. To date the disease has killed 63 people in Indonesia, the world's highest bird flu death toll
- Sep. 1, 2005: Landslide on island of Sumatra kills 14 and more than a dozen are missing
- Sep. 5, 2005: Domestic airliner operated by local carrier Mandala Airlines crashes in residential area of Indonesia's third biggest city Medan, killing 102 aboard and 47 residents in an inferno on the ground
- May 15, 2006: Mount Merapi volcano erupts with clouds of hot gas and rains ash on surrounding areas
- May 27, 2006: Earthquake rocks area around ancient royal city of Yogyakarta killing at least 5,000 and destroying or damaging 150,000 homes
- July 17, 2006: A tsunami after a 7.7 magnitude quake in West Java province kills at least 550 people. At least 54,000 people are displaced

- Dec. 30, 2006: A ferry with at least 600 aboard sinks during a stormy night voyage as it travelled between Borneo and Java
- Jan. 1, 2007: An Adam Air passenger plane flying from Surabaya to Manado with 102 people aboard crashes into the sea off the west coast of Sulawesi
- Feb. 22, 2007: At least 42 people are killed when fire breaks out aboard a ferry which was heading from Jakarta to Bangka Island off Sumatra
- March 6, 2007: Two strong earthquakes kill at least 72 people and injure dozens in the West Sumatra provincial capital of Padang
- March 7, 2007: At least 22 people are killed after a passenger jet of national carrier Garuda Airlines overshoots the runway and bursts into flames on landing in the cultural capital of Yogyakarta

As we can see from the above list, Indonesia is a vulnerable country prone to disaster, both natural and man made. It is proven when within the period of 1998-2004, 1,150 disasters with 9,900 fatalities and Rp. 5.9 billion in losses were recorded. The most frequent disasters were floods (488 events, 773 deaths, Rp. 647 billion in loss), fires (285 events, 79 deaths and Rp. 137.25 billion in loss) and landslides (228 events, 553 deaths and Rp. 21.4 billion in loss) (Bakornas, 2006). Kartodiharjo and Jhamtani (2006) elaborated these disasters as a man made or development disaster caused by the combination of environmental damage due to destructive development and natural causes, worsen by the exploitation of natural resources and injustice in social development policy.

They concluded that the disasters as floods, fires and landslides which happen repeatedly are often occur due to mismanagement of the environment and natural resources. Beside of these man made disasters, natural disasters as earthquakes, tsunami and SARS also happen in Indonesia (Table 1). These disasters threaten many sectors especially the industrial sector.

In many disaster cases, people cannot come to work, product is damaged and it is very difficult to transport the product.

So while a business is paying to fix these problems and damage from the disaster, no money is actually coming in to the business. Hence, many industrial companies in Indonesia lost about nine trillion rupiah after the earthquakes happened in Yogya-Central Java in 2006 (Latour, 2006). The earthquakes not only impact lost to the industrial companies but also to the small and medium companies. Similarly in 2002, PT Semen Cibinong (Tbk) and other companies (especially the small and medium companies) stop their productions after the electricity was shutting down in Bogor.

In December 2004, a massive earthquake struck off Sumatra Island and triggered a tsunami that killed >230,000 people in a dozen countries including 160,000 people in Indonesia's westernmost province of Aceh. One of the industry that effected by Tsunami is the Indonesian coffee. The disaster have an effect on exports of coffee to the United States, the top consumer of the world's second-largest export, a product consumed by 52% of the U.S. population every day as Indonesia is the world's fourth-largest coffee producer. In conjunction with this, Starbucks released a statement expressing low confidence in availability of the company's products from Sumatra, Indonesia, the center of the tsunami.

The representative said that regarding the supply chain, the researchers do believe that there will be an impact on Starbucks supply chain and no longer confident in the short and long-term supply of Indonesian coffee. In the case of SARs which affected Indonesia in 2003 and when over 100 people died Indonesia reported major drops in GDP with high impacts on manufacturing. Indonesia's government said that the SARS crisis gives them a clear message that many of their environmental problems are caused by high population density, neglect in building maintenance and urban decay.

Table 1: Summary of the disasters in Indonesia

Type of disasters	Event	Death	Lost	IDP's	Houses
Landslide	228	553	21,4 billion	30,275	3,733
Flood	488	773	647 billion	1,339,664	83,541
Fire	285	79	137.25 billion	40,285	11,139
Epidemic	103	923	N/A	31,997	N/A
Strom	159	22	N/A	7,722	10,932
Earthquake	66	1,058	9,000 billion	116,681	75,784
Surge	15	0	N/A	1,030	92
Volcanic eruption	24	2	N/A	79,359	6
Social conflict	6	38	N/A	149	N/A
Accident	7	327	N/A	N/A	N/A
SARS	47	139	N/A	N/A	N/A
Tsunami	1	128,858	50,000 billion \$5 billion	522,462	179,321
Total	1,429	132,772	-	2,243,772	375,389

Many manufacturing companies are urged by the government to review their supply chain contacts of potential two way spread of the virus by helping reinforce the need for preventative measures amongst suppliers through education which emphasizes the importance of continuity of supply. Accordingly, Microsoft in Indonesia helped strengthen the capacity of health officials, to enable them to monitor and respond to disease outbreaks and Rio Tinto worked with WHO and the Ministry of Health to increase take up rates of TB inoculation across a region.

Besides disasters, Elkington, vice-president of Marsh's Risk Consulting Practice emphasizes that intellectual property, counterfeiting and ethical risks are often just as important as the financial and natural disaster, therefore considerations should be given equal weighting on a company's risk agenda. This is proven when PT Goodyear Indonesia (Tbk) lost 750 million Rupiah per day and is expected to lose 2.500 because of ethical risks.

Ethical risk is less tangibly recognizable than infrastructure risks can have severe effects on a business. Some companies face the risk that their suppliers may be operating in an environment with poor labor laws and environmental records and there are reputation risks if organizations are seen to exploit that. The severe financial and economic crisis which hit Indonesia in 1997-98 had a severely adverse impact on the manufacturing sector. The production of motor vehicles, including commercial vehicles (buses and trucks), passenger cars and motorcycles, declined steeply in 1998, as most middle-income households, hard hit by the crisis and deferred the purchases of commercial vehicles.

Data supplied by the Association of the Indonesian Automotive Industry (Gabungan Industri Kendaraan Bermotor Indonesia, GAIKINDO) shows that total sales of commercial vehicles and passenger cars dropped from 392,185 units in 1997-68,809 units in 1998, a decline of 82%. Besides ethical and financial crisis, workers strike against management corruption management also could impact the business performance.

The state-owned aircraft manufacturing company PT Dirgantara Indonesia has suspended two executive members of the union (Forum of Communications for Employees) after 1,000 researchers walked off the job at the company's two facilities in Bandung, West Java, on March 5, 2002.

A management spokesman said that the chairman of the labor union and the union's secretary-general, were suspended for violating the law. Researchers say that the

suspensions are an attempt to force the union to drop its demands for an investigation into corruption allegations. Union officials claim that the management has refused to honor an agreement with the union to deal with alleged cases of corrupt, collusive and nepotistic practices in the company.

The management has not investigated the theft of four billion rupiah (US\$400,000) at the company's aircraft service division in 1999 and the disappearance of 18 aircraft engines worth US\$400, 000 in 1998.

## **MATERIALS AND METHODS**

Generally, the increased attention of managing risks in supply chain began in 1999 and many articles published rapidly after Black September 2001 (Paulsson, 2004). In the context of Indonesian Manufacturing Companies (IMCs), managing risks in supply chain is considered relatively immature (Vanany *et al.*, 2007). Until now, there are not many studies exploring risk management in supply chain in the Indonesian context; except two by Pujawan (2007) and Vanany *et al.* (2007).

Pujawan (2007)'s study they developed a model for risk assessment and mitigation and applied the model to a large fertilizer company in East Java, Indonesia. Their study, however was focused more on the risk assessments and mitigation in a single company rather than empirically investigate the risk management in supply chain in Indonesian manufacturing companies. Whereas, Vanany *et al.* (2007) only explored the managers' perspectives on risks.

So, little information is available for describing the risk management in supply chain in the Indonesian context. Due to this reason, this study therefore has investigated the scenario on managing risks in Indonesian companies through interviews done in 2006.

The purpose of these interviews was to provide an opportunity not only to explore the manager's views on the urgency and importance of managing risk in supply chain generally existing in Indonesian manufacturing companies but also to explore sources of risk in greater detail and identify unique supply chain risks practices. In other words, the current state of practice in managing risks can be identified. About 10 manufacturing companies from 10 different sectors were randomly selected based on the list obtained from Asosiasi Logistik Indonesia (ALI) (Table 2).

Interviews were conducted with manager primarily involved in the supply chain in their respective organizations.

Table 2: Respondents interviewed

Company name	Position	Manufacturing sectors
PT Danone Indonesia tbk	Supply chain manager	Food, beverage and tobacco
PT Sioen Indonesia	Senior exim, logistics	Textiles product manufacturing
PT Matsushita Gobel Battery Industry	Purchasing manager	Manufacturing of chemicals, oil, coal and rubber
PT Process Global	Supply chain manager	Wood, Bamboo, Rattan Grass etc
PT Nissan Diesel Indonesia	Purchasing manager	Fabricated metal products and equipment manufacturing
PT Philips Ralin Indonesia	Supply chain manager	Electrical and Electronics
PT Dinamika Energitama	Purchasing manager	Basic metal manufacturing
PT Sanwa Indonesia	Purchasing manager	Rubber and non-metallic mining products
PT Sumatra Prima Fibreboard	Purchasing manager	Paper and paper manufacturing, printing and publishing
PT Transmega	Purchasing manager	Other processing manufacturing

RESULTS

Based on these interviews, this study discovered several points associated with supply chain disruptions in Indonesian companies. Generally, they agreed that risk could arise within an individual company or from interaction between network partners or could be at environment level. Sometimes, they classified the risk sources as internal and sometimes as external. Following this, there is a need to manage the risks as they believed that companies should develop supply chain risk strategies.

Figure 1 shows that most of the managers admitted that their respective companies could not fulfill the demand if disruption of supply chain risk occurs and therefore, it is necessary to manage the risks by developing supply chain risk strategies. In addition to this, companies should develop strategies that can mitigate the impact of these risks, namely) improve visibility to key supply chain partners that can quickly detect disruptions) well position resources that enable quick short term recovery plans and) long-term collaborative approaches to eliminate disruptions in the future.

The managers also claim that there is a relationship between companies that experience with risks and the strategies they use in dealing with the risks which directly will impact the performance. Consequently, they believed that the cost and lost of profit can be reduced if the strategy to handle the risk is efficiently implemented. Despite of their current strategies in reducing the disruptions in supply chain they believe that their companies could reduce the lost in profit through risk assessment and evaluation.

Nevertheless, they claimed that companies should invest more in improved inventory and capacity visibility systems if they have high exposure to supply chain risk and this could increase the cost. They are more likely need to add incremental inventory and manpower to buffer t he impact of disruptions. Besides improved

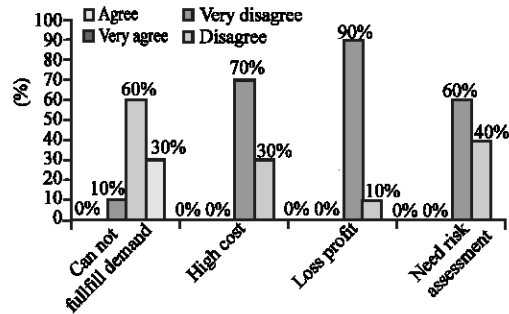


Fig. 1: Urgency in managing the risk in supply chain

inventory they are also need to invest in longer term solutions such as training and collaborative tools to establish strong supply chains that are able to respond to disruptions. However, they believed that strategies in terms of sharing information about the risk, collaborative relationship among supply chain partners, corporate social responsibility for risk and training and knowledge on risk are among the significant factors towards reducing the disruptions in supply chain risk.

In summary while no company can eliminate the probability of a major supply chain disruption, it is believed that those companies that implement the appropriate practices will be better positioned to manage the potentially risks or incidents when they occur and to improve their performance. Local companies in Indonesian industries, especially the small and medium sized enterprises still have the attitude of wait and see. As indicated by Vanany *et al.* (2007) that there is a poor understanding of supply chain risk or even perhaps that there is confusion in managing the risk.

Even though, the concept of supply chain risk is relatively new to Indonesia, nevertheless, many companies in the world begun to recognize the importance of managing the supply chain risk. This is due to the fact that increased risk will attribute to the higher probability of product and service flow disruptions in the chain and a major disruption in the supply chain can shut down a company and have huge consequences on profitability. The disruptions can be costly and have in many cases brought problems in distribution and production.



## DISCUSSION

Due to demanding customers and competitive pressures, businesses today are restructuring themselves to operate on a global basis to take advantage of the global product, service and capital markets. There are numerous economic, political, logistical, competitive, cultural and infrastructure concerns in operating globally. Typically, a firm operating globally is part of a complex supply chain. Many recent events (for example, earthquake, SARS, Tsunami and terrorist attacks) have demonstrated that the risk affecting one company or process in a supply chain may interrupt the continuity of operations of other members of the supply chain.

There is wide acknowledgement of the risks and vulnerabilities in supply chains (Miller, 1992; Svensson, 2000; Juttner *et al.*, 2003; Juttner, 2005; Norrman and Lindroth, 2004; Chopra and Sodhi, 2004; Christopher and Peck, 2004; Spekman and Davis, 2004).

Surprisingly, there is a general lack of guidance on the phenomenon of managing risk in supply chain. In the case of Indonesia for example, there is room for discussion on the supply chain risks practices and its effects on business growth as Indonesia is a developing country and the most frequent country to have the disasters (Vanany *et al.*, 2007).

In other words, there is no evidence of supply chain risks practices studies to mitigate the disruptions in supply chain being conducted in the Indonesia context. Vanany *et al.* (2007) indicates that large proportions of Indonesian manufacturers still do not implement supply chain risks practices generally believed can improve business performance. This present study, therefore examines the supply chain risk practices that can be adopted in the Indonesian manufacturing companies to improve companies' risk performance. This study is interested to investigate the importance of supply chain risks management.

It is believed that supply chain risks occur; a quick response can help minimize the consequences. This requires companies to have practices of supply chain risks in place so that the performance of supply chain risks can be improved. Consequently, supply chain risks practices are associated with specific supply chain sources.

## CONCLUSION

In summary, while no company can eliminate the probability of a major supply chain disruption, it is believed that those companies that implement the appropriate practices will be better positioned to manage

the potentially risks or incidents when they occur and to improve their performance. Local companies in Indonesian industries, especially the small and medium sized enterprises still have the attitude of wait and see.

## REFERENCES

- Bakornas, P.B., 2006. Indonesia disaster management information system. Paper presented at the Workshop to Improve the Compilation of Reliable Data on Disaster Occurance and Impact, Bangkok, Thailand. <http://www.em-dat.net/documents/bangkok06/IndonesiaDMIS.pdf>.
- Bosman, R., 2006. The new supply chain challenge: Risk management in a global economy. <http://www.fmglobal.com/pdfs/chainsupply.pdf>.
- Brindley, C., 2004. Risk Focus Towards Customers. Ashgate Publishing Limited, USA..
- Chapman, R.J., 2006. Simple Tools and Techniques for Enterprise Risk Management. John Wiley and Sons, England, ISBN-10: 0470014660, pp: 494.
- Childerhouse, P., R. Hermiz, R. Mason-Jones, A. Popp and D.R. Towill, 2003. Information flow in automotive supply chains-identifying and learning to overcome barriers to change. *Ind. Manage. Data Syst.*, 103: 491-502.
- Chopra, S. and M.S. Sodhi, 2004. Managing risk to avoid supply-chain breakdown. *Sloan Manage. Rev.*, 46: 53-61.
- Christopher, M., 2003. Understanding Supply Chain Risk: A Self-Assessment Workbook. Centre for Logistics and Supply Chain Management, School of Management, Cranfield University, Cranfield, Bedford, UK.
- Christopher, M. and H.L. Lee, 2004. Mitigating supply chain risk through improved confidence. *Int. J. Phy. Distribution Logistic Manage.*, 34: 388-396.
- Christopher, M., and H. Peck, 2004. Building the resilient supply chain. *Int. J. Logistics Manage.*, 15: 1-14.
- Elkington, M., 2006. Managing risk in global supply chains. *Strategic Risk*, November, 26-27.
- Faisal, M.N., D.K. Banwet and R. Shankar, 2006. Supply chain risk mitigation: Modeling the enablers. *Bus. Process Manage. J.*, 12: 535-552.
- Giannakis, M., S. Croom and N. Slack, 2004. Supply Chain Paradigms. In: *Understanding Supply Chains*, New, S., and R. Westbrook (Eds.). Oxford University Press, Oxford, London, pp: 1-21.
- Hammel, T.R. and L.R. Kopczak, 1993. Tightening the supply chain. *Prod. Inventory Manage. J.*, 34: 63-70.

- Handfield, R.B. and E.L. Nichols, 2002. Supply Chain Redesign: Transforming Supply Chains into Integrated Value Systems. FT Press, USA., ISBN-10: 0-13-060312-0.
- Hendricks, K.B. and V.R. Singhal, 2003. The effect of supply chain glitches on shareholder wealth. *J. Operation Manage.*, 21: 501-522.
- Hendricks, K.B. and V.R. Singhal, 2005. Association between supply chain glitches and operating performance. *Manage. Sci.*, 51: 695-711.
- Jennings, D., 2002. The best law X 4 X far. *Supply Manage.*, 7: 40-41.
- Johnson, M.E. and T. Davis, 1995. Gaining an edge with supply chain management. *APICS Performance Advantage*, 5: 26-31.
- Juttner, U., H. Peck and M. Christopher, 2003. Supply chain risk management: Outlining an agenda for future research. *Int. J. Logistics Res. Appl.*, 6: 197-210.
- Juttner, U., 2005. Supply chain risk management understanding the business requirements from a practitioner perspective. *Int. J. Logistics Manage.*, 16: 120-141.
- Kartodiharjo, H. and H. Jhamtani, 2006. Politik Lingkungan dan Kekuasaan di Indonesia. Equinox Publishing, Jakarta, Indonesia.
- Latour, A., 2006. Trial by fire: A blaze in albuquerque sets off major crisis for cell-phone giants. *Wall Street J.*, pp: A1
- Lee, H.L. and S. Whang, 2000. Information sharing in a supply chain. *Int. J. Manuf. Technol. Manage.*, 1: 79-79.
- Li, S., B. Ragu-Nathan, T.S. Ragu-Nathan and S.S. Rao, 2006. The impact of supply chain management practices on competitive advantage and organizational performance. *Omega Int. J. Manage. Sci.*, 34: 107-124.
- Lonsdale, C. and A. Cox, 1998. Outsourcing: A Business Guide to Risk management Tools and Techniques. Earlsgate Press, Boston, Eastgate, ISBN-10: 187343961X, pp: 221.
- Lummus, R.R. and R.J. Vokurka, 1999. Defining supply chain management: a historical perspective and practical guidelines. *Ind. Manage. Data Syst.*, 99: 11-17.
- March, J. and Z. Sharpira, 1987. Managerial perspectives on risk and risk taking. *Manage. Sci.*, 33: 1404-1418.
- McGillivray, G., 2000. Commercial risk under JIT. *Canad. Underwriter*, 67: 26-30.
- Mentzer, J.T., W. DeWitt, J.S. Keebler, S. Min and N.W. Nix *et al.*, 2001. Defining supply chain management. *J. Bus. Logistics*, 22: 1-25.
- Miller, K.D., 1992. A framework for integrated risk management in international business. *J. Int. Bus. Stud.*, 23: 311-331.
- Mitroff, I.I. and M.C. Alpasan, 2003. Preparing for evil. *Har. Bus. Rev.*, 81: 109-115.
- Nelson, D., P.E. Moody and R. Mayo, 1998. Powered by Honda: Developing Excellence in the Global Enterprise. 1st Edn., John Wiley and Sons, New York, ISBN-10: 047118182X, pp: 272.
- Norrman, A. and R. Lindroth, 2004. Categorization of Supply Chain Risk and Risk Management. In: *Supply Chain Risk*, Brindley, C. (Ed.). Ashgate Publishing Limited, UK..
- Paulsson, U., 2004. Supply Chain Risk Management. In: *Supply Chain Risk*, Brindley, C. (Ed.). Ashgate Publishing Limited, Burlington, UK., pp: 79-99.
- Pujawan, I.N., 2007. A model for proactive supply chain risk management. Proceedings of the 2nd International Conference Operations and Supply Chain Management (OSCM' 07), Bangkok, Thailand.
- Pusponegoro, A.D., 2004. Terrorism in Indonesia. *Prehospital Disaster Med.*, 18: 100-105.
- Ritchie, B. and C. Brindley, 2001. The information-risk conundrum. *Marketing Intell. Plann.*, 19: 29-37.
- Sarkar, P., D. Armstrong and V. Hua, 2002. Idling time: The west coast shutdown is beginning to hurt workers, industries dependent on imports. *Chronicle Staff Writers, San Fransisco Cronicle*, pp: B1. [http://articles.sfgate.com/2002-10-03/business/17568229\\_1\\_fremont-plant-michael-damer-nummi](http://articles.sfgate.com/2002-10-03/business/17568229_1_fremont-plant-michael-damer-nummi).
- Smichi-Levi, D. and P. Kaminsky, 2000. Designing and Managing the Supply Chain: Concepts and Strategies and Cases. McGraw Hill, New York.
- Spekman, R.E. and E.W. Davis, 2004. Risky business: Expanding the discussion on risk and the extended enterprise. *Int. J. Physical Distribution Logistics Manage.*, 34: 414-433.
- Svensson, G., 2000. A conceptual framework for the analysis of vulnerability in supply chains. *Int. J. Phys. Distribution Logistics Manage.*, 30: 731-750.
- Tang, C.S., 2006. Perspectives in supply chain risk management. *Int. J. Prod. Econ.*, 103: 451-488.
- Vanany, I., S. Zailani and A. Rusdiansyah, 2007. Supply chain risk management in indonesia manufacturing companies: Managers perspectives. Paper Presented in the 2nd International Conference Operations and Supply Chain Management, Bangkok, Thailand.