# RISK MANAGEMENT FOR LOCAL LOGISTICS SERVICE PROVIDER FOCUSING ON OUTBOUND ROAD FREIGHT TRANSPORTATION

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Thesis
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ABSTRACT

Establishing the ASEAN Economic Community (AEC) in 2015 has increased Thailand's opportunities for cross-border trades and import-export shipments especially between Thailand and its four immediate neighbours - Myanmar, Malaysia, Laos, and Cambodia. The major mode of transportation among these countries is road transportation. Fierce competition will occur as multinational logistics companies are the key players and compete with local logistics service providers. Hence, to survive the competition under AEC, risk management is one of the ways to enhance the ability of logistics firms. This research identified the risks for their logistics services and found avenues to manage the risks. Relevant literature, regarding the risks related to the Outbound Road Freight Transportation Service, was validated by industry experts. Risk severity and the likelihood of occurrence have been analysed by using the Analytical Hierarchy Process (AHP) technique and the Likert scale. Finally, suggestions for mitigating the risks have been included based on the 4Ts strategies.

KEY WORDS: RISK IDENTIFICATION/ ROAD FREIGHT TRANSPORTATION / LOGISTICS SERVICE PROVIDERS/ ASEAN ECONOMIC COMMUNITY (AEC)

114 pages

การจัดการความเสี่ยงสำหรับผู้ให้บริการด้านโลจิสติกส์ท้องถิ่นมุ่งประเด็นไปที่การขนส่งสินค้าขาออกทางรถบรรทุก

RISK MANAGEMENT FOR LOCAL LOGISTICS SERVICE PROVIDER FOCUSING ON OUTBOUND ROAD FREIGHT TRANSPORTATION

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บทคัดย่อ

การเปิดประชาคมเศรษฐกิจอาเซียน(ASEAN Economics Community, AEC) ในปี 2558 กระตุ้นให้ไทยเกิดโอกาสทางการค้าภายในภูมิภาค รวมถึงด้านการนำเข้า-ส่งออกเพิ่มมากขึ้น โดยเฉพาะกับ 4 ประเทศเพื่อนบ้านของไทย คือ ประเทศเมียนมาร์ มาเลเซีย ลาว และกัมพูชา ซึ่งมีการใช้การขนส่งทางถนนเป็นหลัก แต่การเปิดประชาคมเศรษฐกิจอาเซียนนี้ ส่งผลให้เกิดการแข่งขันที่รุนแรงมากขึ้น โดยเฉพาะในกลุ่มผู้ให้บริการโลจิสติกส์ของไทย เพราะมีผู้ให้บริการโลจิสติกส์ข้ามชาติเข้ามาแข่งขัน ด้วยเหตุนี้ผู้ให้บริการด้านโลจิสติกส์ของไทยจึงควรปรับปรุงและพัฒนาศักยภาพของตนเอง การจัดการความเสี่ยงจึงเป็นอีกวิธีหนึ่งในปรับปรุงศักยภาพขององค์กร โดยการระบุความเสี่ยงสำหรับการบริการด้านโลจิสติกส์กับประเทศเพื่อนบ้าน พร้อมทั้งหาวิธีในการจัดการความเสี่ยงเหล่านั้น ดังนั้น งานวิจัยนี้จึงศึกษาปัจจัยความเสี่ยงจากการทบทวนวรรณกรรมต่างๆที่เกี่ยวข้อง ซึ่งมีผู้เชี่ยวชาญเป็นผู้ตรวจสอบ และจัดลำดับความสำคัญปัจจัยเหล่านี้ โดยการพิจารณาจากมุมมองด้านความรุนแรง เทคนิคการตัดสินใจกระบวนการลำดับชั้นเชิงวิเคราะห์ (Analytical Hierarchy Process, AHP) และเทคนิค Likert Scale นำมาประยุกต์ใช้ เพื่อวิเคราะห์มุมมองด้านโอกาสที่จะเกิดความเสี่ยง แสดงถึงลำดับความสำคัญของปัจจัยความเสี่ยงแต่ละปัจจัย พร้อมทั้งเสนอแนะวิธีการจัดการกับความเสี่ยง โดยอ้างอิงจากทฤษฎี 4 Ts

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# CHAPTER I
# INTRODUCTION

## 1.1. Background and problem statement

Currently, the globalization has become an important issue in the world economic and enhanced the fierce competition. Hence, many countries in each region need to improve their abilities and develop their logistics efficiency to reduce cost and increase their competitive advantages. Each region creates collaboration and international integration in order to gain benefits, get bargaining power and advance on international trading, investment, and information technology. Furthermore, the integration also comprehend in liberalization within the region to facilitate logistics activities of company, eliminate tariff and non-tariff barrier, and free flow in order to create the single market, attract external investors, and stimulate demand.

ASEAN Economic Community (AEC) is one of international integration between 10 ASEAN member countries for overall benefit and competitive advantage for all members especially in international trading. AEC is going in the same direction as European Union (EU) had done in the past which has resulted in the liberalization in trade, service, investment, labor movement as well as enhanced bargaining power of the region. Thepchatree (2013) studied the impact from the opening of AEC on Thailand that the free flow of goods, services, investment, capital, and skilled labor will increase. AEC makes the region to be a bigger market and have more industries and services. People have more alternatives to select goods and service. Business cooperation and interaction between Thailand and other countries in ASEAN will increase. As Thailand has advantage on its location and existing production base from foreign investors and fully equips with every exports factor such as infrastructure, location, capability of production, and low production cost, these factors will strengthen Thailand's position as transportation hub for ASEAN especially for The Greater Mekong Sub-Region (GMS). Likewise, the article in Thai-AEC (2013) analyzed the opportunities of Thailand LSP. If Dewei project completes, Thailand will

be the important route which connect East-West Corridor and link node between Dawei deep seaport and Laem Chabang port as shown in Figure 1.1. Hence, it has increased Thailand's opportunity for cross-border trade and import-export shipments especially between Thailand and four immediate neighbors – Myanmar, Laos, Malaysia, and Cambodia.

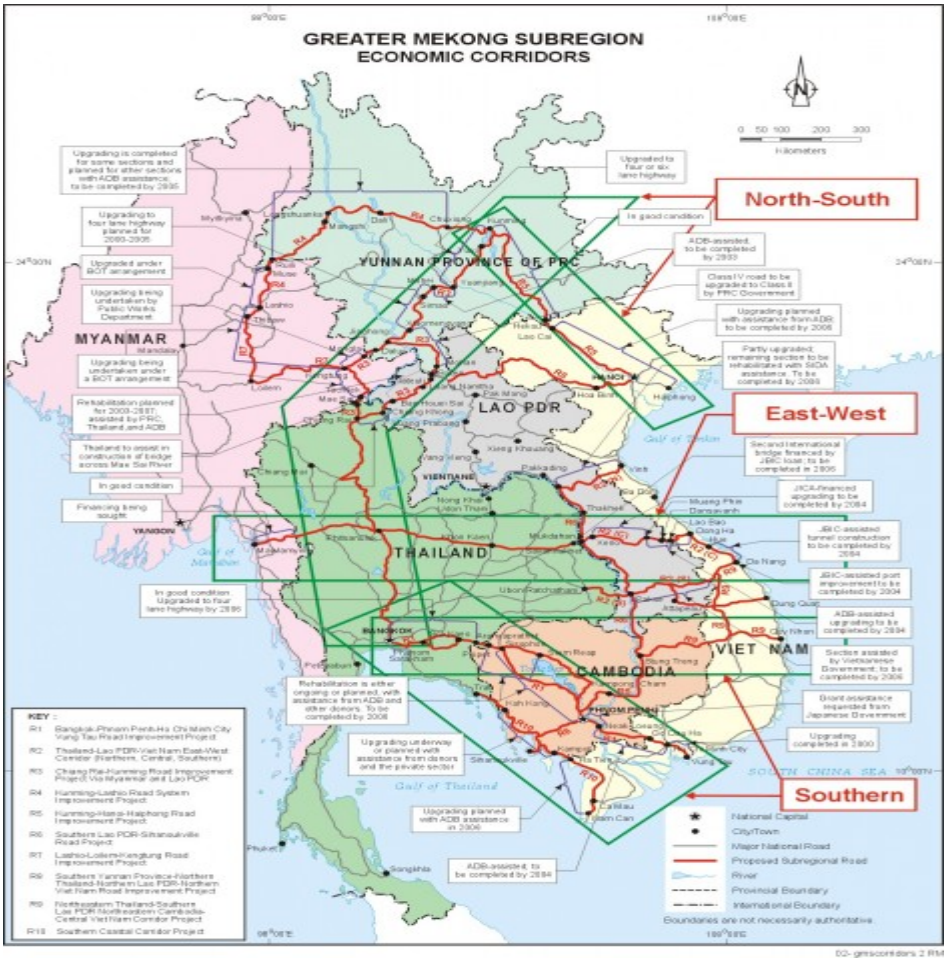


**Figure 1.1** GMS economic corridors transport routes
Source: GMS economic corridors (www.siamintelligence.com)

In negative site, fierce competition will occur as professional multinational companies owned by foreigners will use their own competitive advantage to get major shares and compete with local logistics service providers (LSP). Furthermore, in article of "AEC analysis" Thai-AEC (2013) revealed that logistics costs of Thailand are still far behind our competitors especially Malaysia and Singapore and local LSPs

need to develop and prepare for the coming of AEC. Mr. Chadchard Sittipan, Deputy Minister of Communication, also revealed in article Thai-AEC (2012) that the liberalization of the transport sector, local LSP is directly affected especially for outbound road freight transportation which trend of demand aims to continue increasing. Hence, local LSPs should adjust and improve their ability in order to maintain their market share and position in supply chain network. Furthermore, the threatening of multinational logistics providers creates a lot of risk for Thai logistics service companies. Thai companies need to reduce the risks which may occur and disrupt the company performance and have negative impact to the local companies, performance and operation. To mitigate the risks, the risk factors which will affect the company's performance should be identified. Then analyze the severity of impact and the likelihood of occurrence in order to priority the risk. Finally, the risk mitigation strategy will be recommended.

## 1.2. Research Questions

Research question include:

1) What are the risk factors from current problems of outbound road freight transportation for LSP associated with current working process and performances of firms?

2) According to risk factors of outbound road freight transportation, how are they prioritized based on severity and likelihood of occurrence?

3) How to manage the critical risks in research question 2?

## 1.3. Research Objectives

The objectives of this research are shown in the following.

1) To identify risk factors for logistics services provider (LSP) focus on outbound road freight transportation with respect to the opening of AEC.

2) To prioritize above risk factors based on severity and likelihood of occurrence.

3) To suggest the way to mitigate the critical risk.

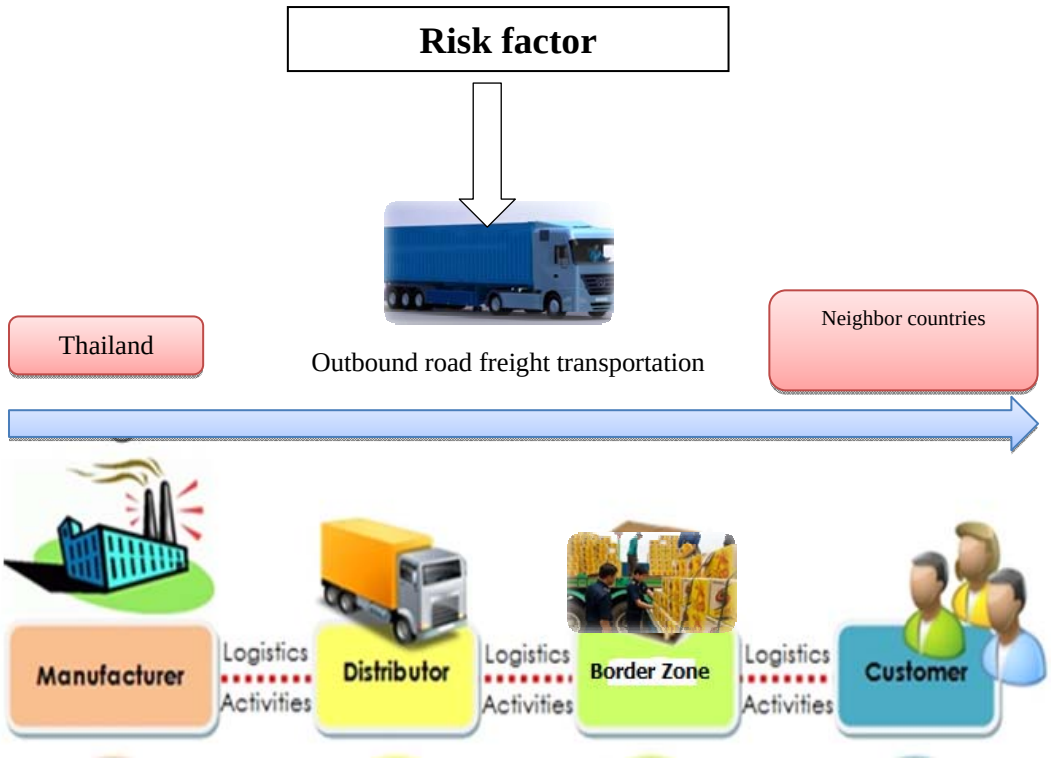


**Figure 1.2** Research scope

## 1.4. Research Scope

The focus of this study is limited to the risk for outbound road freight transportation service in the land-link countries namely Thailand, Laos, Cambodia, Myanmar, and Malaysia as shown in Figure 1.2 by focusing on the overview without specific on the procedure of each country.

## 1.5. Expected Resulted

The expected results are shown in the following.

1) Illustration of the potential risk factors for outbound road freight transportation of LSPs.

2) The prioritization of each risk and selection of the critical risks.

3) Mitigation strategies to manage critical risk will be recommended for local LSPs to maintain their market shares and competitive advantage.

# CHAPTER II
# LITERATURE REVIEW

In this section, the purpose of literature review is to present the idea, concept, theory, and related research to in reference to this study and to explore the gap from previous study. This study focuses on the risks of outbound road freight transportation businesses of local logistics service providers. Hence, the related information, theory, and research with respect to the four following areas are review.

2.1. Logistics service providers (LSP) in Thailand

2.2. ASEAN Economic Community (AEC) and its impact on local logistics (LLSP) business

2.3. Risks in potential logistics service for road freight transportation

2.4. Methodology to find the optimal mitigation strategies

## 2.1. Logistics service providers (LSP) in Thailand

### 2.1.1 Logistics history

Transportation is an important logistics activity, for the definition of "Logistics" in 19$^{th}$ century, is planning and managing the transportation of goods from one point to another point especially in military, but in the management field, it means planning and managing to achieve complicated mission (Komnamool, 2007). When time passes, 20$^{th}$ century, the meaning of logistics has changed according to the world doing business. In the field of military, the meaning of logistics is to plan and manage the movement of military force, equipment, and other related stuff. In term of industry and business, logistics means planning and controlling flow of material and goods to distribute to consumer. CLM book - in Lambert., Stock., and Ellram (1998) defined logistics as *"The process of planning, implementing and controlling the efficient, effective flow and storage of goods, services, and related information from point of*

*origin to point of consumption for the purpose of conforming to customer requirements.”*. Mentzer et al. (2001) also defined logistics as managing supply chain network though upstream to downstream linkage, as flow of product, service, information, and finance. Supply chain network involved different logistics activities to link each process together (Christopher, 1992). Stevens (1989) suggested that goal of logistics is to serve customer or end user requirement. From the definitions mentioned above, it could be summarized that logistics is the conceptual flow of supply chain management as shown in Figure 2.1.

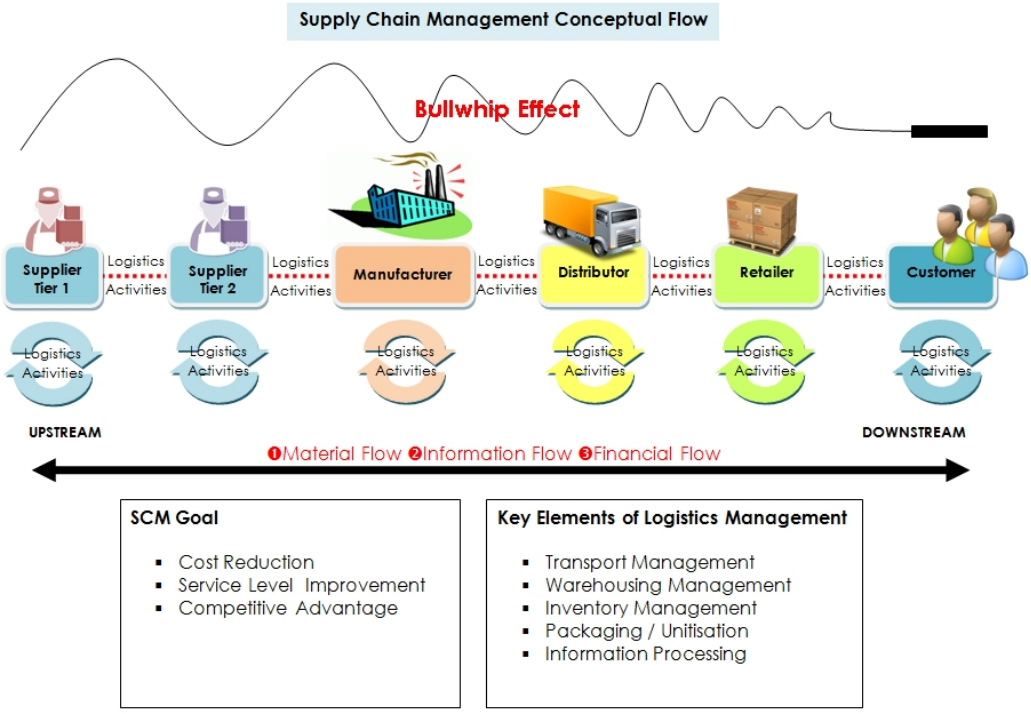


**Figure 2.1** Supply chain management conceptual flow review definition
Source: Adapted base on literature of CLM book - in Lambert., Stock., and Ellram (1998), Mentzer et al. (2001), Christopher (1992), and Stevens (1989)

Currently, logistics mainly emphasizes on transportation. Every party needs to be linked with each other by the transportation. For example, the material is transported from the source to serve manufacturing and afterward finish goods is distributed to consumer. Transportation cost is not only vehicle expense but also packaging, handling, loading, and unloading expense. If these processes are done

faster with high efficiency and low damage, the transportation cost will be reduced and the final cost of the product is be cheaper as well (Pathomsiri, 2010).

### 2.1.2. Type of Transportation

For Thailand transportation system, journal logistics corner (2010) divided transportation into 4 modes including:

2.1.2.1 Land Transportation, can be divided into 2 types as *follow*

1) Road Transportation: This form of transport is the highest volume and flexibility. It is done by using car or truck to shift cargo from one location to destination. The advantage of characteristic of road transportation can provide services by Door-to-Door or deliver directly to customer that gives more convenience to both producer and consumer.

2) Rail Transportation: Most of the products which are high volume but low value usually require this transport form, for example rice, sugar, cement, coal, gas, and petroleum product. However, this transportation form is not really up to date which is able to cope with the current demand. Therefore, it needs to be improved for both infrastructure and ability to link with other modes.

2.1.2.2 Water Transportation: It is the lowest cost per unit transportation form. Concerning to time, this mode takes the longest period of time compare to other modes. Therefore, it will be the most suitable mode if delivery time is not tough.

2.1.2.3 Air Transportation: This mode can transport the cargo farthest and fastest mode but it also has the highest cost. Air transportation infrastructure construction needs to support the massive amount of air transportation system and also needs to connect road transportation to serve consumer's demand.

2.1.2.4 Pipeline Transportation: This transport mode is unique because cargo must be in liquid form and use one-way transportation from source to destination without backhauls. The popular products that use this mode include water, crude, petroleum product, and natural gas. However, more operators are still using road transportation more than pipeline due to the cost is lower and road network can be accessed in the whole country. On the other hand, pipeline can be available only

eastern area of Thailand, and the infrastructure is limited. It is not worth to invest because its utilization is approximately 50 percent.

**Table 2.1** Comparison of the selection criteria for each transport mode

| **Criteria** | **Transports mode** | | | | | |
|---|---|---|---|---|---|---|
| | **Land** | | **Water** | | **Air** | **Pipeline** |
| | **Road** | **Rail** | **Inland** | **Ocean/Sea** | | |
| **Cargo type** | General | Low Value | Low Value | Low Value | High Value | General |
| **Volume** | Medium | High | Highest | Highest | Low | Highest |
| **Cost per Unit** | Medium | Low | Lowest | Lowest | Highest | Low |
| **Time** | Fast | Slow | Slowest | Slowest | Fastest | Faster |
| **Door to Door** | Yes | No | No | No | No | No |

Source: Pathomsiri (2010)

Table 2.1 shows the comparison between each transportation mode which indicates the advantage and disadvantage. Road transportation is the only one mode that can provide Door-to-Door service to customer, fast delivery, and easy to be controlled, and it is appropriate with businesses focusing on precise time. Moreover, road transportation currently is only the mode which can connect other modes together.

Reveal from Strategic plan for Department of Transport (2011-2015), recently, road transportation becomes significant factor in term of economic development in Thailand and has highest proportion comparing to other modes. In addition, Transportation is significant for not only domestic transportation but also international transportation. It also likely increases based on international road freight volume shown in Table 2.2 according to the opening of AEC. This integration will make demand of road freight transportation increased. The government tries to

encourage Logistics Service Provider (LSP) to enhance performance to increase competitiveness after AEC is launched by preparing strategy plans, developing in information system, important facility, multimodal transport system, and staff's knowledge and skill, and improving infrastructure to support the increasing of cargo trucks and enhance ability to link trade, services and investment in the region.

**Table 2.2** Volume of international cargo transport inbound-outbound (unit: thousand tons)

| Goods Transportation | Inbound | | Outbound | |
|---|---|---|---|---|
| | 2007 | 2008 | 2007 | 2008 |
| Vessel | 101,774 | 99,370 | 92,812 | 93,907 |
| Rail Way | 77 | 70 | 685 | 296 |
| Road | 3,417 | 7,737 | 7,751 | 8,372 |
| Air | 223 | 241 | 462 | 418 |
| Mail and others | 8,481 | 6,200 | 1 | 2 |
| Total | 113,972 | 113,618 | 101,711 | 102,996 |

Source: Strategic plan for Department of Transport (2011-2015)

### 2.1.3. Form of Transportation Network

There are many forms of transportation network to enhance transport efficiency but the popular form is divided into two big forms.

2.1.3.1. Distribution Center (DC): This network was created to reduce complication of transportation, so that it is easier to manage the path. Moreover, it allows consolidate goods to be filled in truck in full, load and reduce overall cost of transportation.

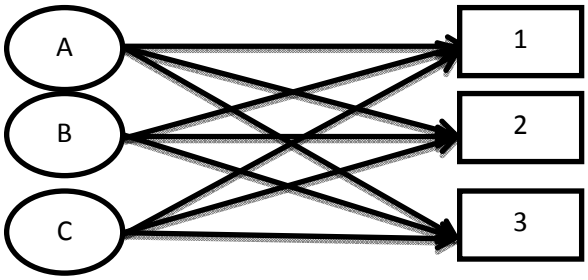


**Figure 2.2** Goods distribution from Manufacturing Direct to Customer
Source: Logistics Corner

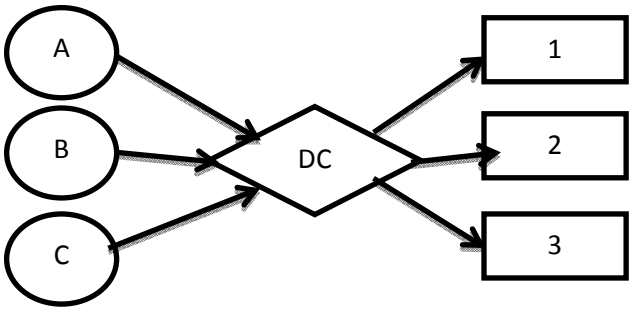


**Figure 2.3** Goods distribution from Manufacturing to Customer via DC
Source: Logistics Corner

From above Figures, it explains benefit of distribution center. In case of having no central distribution as Figure 2.2, manufacturer A, B, and C need to send products to customer 1, 2, and 3 directly. Manufacturer has to drive with all 9 routes. Some of trucks may not be filled in full capacity and on the ways back, the trucks have to run empty for a long way. That is so costly. However, distribution center is used as shown in Figure 2.3, the manufacturer only sends product to the hub or distribution center and consolidate product with other trucks which have the same destination before distributing to customer 1, 2, and 3. Thus, the routes are declined to only 6. By seeing that, if number of routes are fewer and have shorter distance, transportation cost will drop down obviously.

2.1.3.2. Multimodal Transportation: As the transportation mode has been mentioned above, there are various forms of transportation. Hence, government tries to emphasis and contribute to logistics provider to integrate business processes. For example, shipping and freight forwarder are integrated to be one stop service to enhance efficiency, easiness, and competitiveness.

In term of economic corridor, Banomyong (2008) provided the definition of transportation, logistics, and multimodal as shown in Table 2.3.

**Table 2.3** Definition of transportation, logistics, and multimodal in term of economic corridor

| Type | Definition |
|---|---|
| 1) Transportation | *"physically links an area or region"* |
| 2) Logistics | *"not only physically links an area or a region but also harmonizes the corridor institutional framework to facilitate the efficient movement and storage of freight, people and related information."* |
| 3) Multimodal | *"physically links an area or region through the integration of various modes of transport"* |

Source: Banomyong (2008)

### 2.1.4. Logistics Service Provider (LSP)

According to Lieb.et.al (1993), the definition of logistic service provider is the external company which offers service in some or whole logistics activities to customer. Sorat (2008) stated that logistics service provider is an external organization which specializes in logistics activities under contract in exchange with benefit. Coyle.et.al (1993) explained LSP as the provider of whole or some logistics activities by integrating various services together such as transportation, warehousing, distribution and financial and also including problem solution management in supply chain. Khanasawas (2010) defined LSP as the logistics operator who provides management, control, and delivery goods to liner-company which includes various activities and also full service by link each activity together from origin to destination. Lambert.et.al. (1998) mentioned LSP as the provider who involve with support or prepare resource, knowledge, and asset to fulfill efficiency in supply chain system. According to Gary R. Allen, (2001), LSP can be divided into 4 levels as in Table 2.4.

**Table 2.4** Level of logistics service providers

| LSP levels | Key Attribute | Geographic Coverage |
|---|---|---|
| 1. Asset Base Logistics (2PL) | • Focus cost reduction | • Locations specific |
| 2. Third Party Logistics (3PL/TPL): | • Enhance capabilities<br>• Broader service offering | • Multiple locations (intra or inter regional) |
| 3. Lead Logistics Management (LLM) | • Project management<br>• Single point of contract | • Pan-regional integrators |
| 4. Joint Operation Model (JOM) | • Speed of integration<br>• Knowledge transfer<br>• Share risk and reward<br>• Comprehensive solution | • Global supply chain integrators |

Source: Base on literature of Gary and Allen (2001)

According to Athikomrattanakul (2006), services of logistics can be outsource transportation, warehousing, logistics planning shipment consolidation, inventory management, custom clearance/ VAT/ duty process, picking and packing, electronic data interchange (EDI), export/import, labeling return/reverse logistics, order processing, selection of carriers, forwarders, and customs brokers, invoicing, track and trace, fleet management, inspection/ quality control, information system management, management report, payment processing, supply chain design, customer services, consulting, cross-docking, promotional support, freight bill payment/ freight rate negotiations. Kersten et al (2012) identified logistics services activities as transportation, handling, clearance, quality check, warehousing, inventory management, labeling, consignment, logistics consulting, packaging, and financial service.

### 2.1.5. The current situation of Thailand LSP

According to Visodilok.et.al (2012) in the end of year 2011, there are approximate 18,399 logistics service providers in Thailand and it is likely to increase around 3.7 percent per year. Most of LSPs in Thailand provide the related services in transportation sector especially truck transportation which accounts for 82 percent approximately of total freight transportation. Moreover, its market value kept increasing since year 2005. EIC (2013) "To survive for transportation business of Thailand in AEC" revealed as following situations. Currently, most of Thailand's LSPs focus on merely services transportations, but export-import which is the major activities seems to be taken for granted. Hence, Thailand's LSP therefore is only sub-contract for foreigner companies which there are fierce competition. In order to maintain the customer, many companies offer the lower price to attract their customers. However it negatively impacts on the profit of the companies. Moreover, the coming of AEC in the end of 2015 will attract foreigner companies to invest and share market value in term of taking over due to 70% holding equity rule. To survive in the competition, local LSP should adjust their companies' operations or structure such as collaboration or integration in term of logistics activities in order to enhance value in supply chain. For the opportunity from the opening AEC, EIC (2015) had mentioned in the article "Trucking business with great opportunity in GMS" that the globalization will enhance the demand of trucking business. Due to 85% of domestic and inter-region transportation used the truck mode. By predictive, the growth of trade value in region will increase from 25% currently to 30% in 2030 due to the increasing of trading activity and production influence to value of trucking business of Myanmar, Laos, and Cambodia increase to 400,000 million baht per year and still have trend to grow continuously. This is the great opportunity for Thailand trucking business. The article of EIC (2015) "As AEC revs up, Thai trucking companies are in pole position", indicates that Thailand will benefit from the trucking companies because of the booming of cross border export-import demand and the requirement of source to supply industries in special economic zone (SEZ) in neighbor countries. Based on Banomyong (2010), the LSPs in GMS countries have developed rapidly to enhance ability to support manufacturing sector but most of local LSPs are small enterprises. However, logistics performance of Cambodia, Lao DPR, and Myanmar still far behind

Thailand but local LSPs in Thailand still face many difficulties to directly compete with international companies (For example DHL, FedEx, and K-line). Article of "AEC analysis" Thai-AEC (2013) revealed about the current situation of Thailand LSP that most of LSPs which can provide the whole logistics activities are international firms and only a few are local LSP.

## 2.2. ASEAN Economic Community (AEC)

### 2.2.1. History of AEC

AEC or ASEAN Economic Community is the integration of 10 countries in the region for overall benefit and competitive advantage of the country members especially in international trade. Moreover, it keen to have the same direction as European Union (EU) had done in the past which has resulted in the liberalization in trade, service, investment, labor movement as well as enhance bargaining power of the region.

The agreement to establish AEC was started from the 9$^{th}$ Annual Meeting of the ASEAN Members in Indonesia in 2003. The ASEAN Community comprises 3 elements namely ASEAN Political-Security Community (ASPC), ASEAN Socio-Cultural Community (ASCC) and ASEAN Economic Community (AEC) under the motto "One Vision, One Identity, One Community". The meeting was to have AEC blueprint signed in 2008, so that the arrangement of the clear plan framework development can be done as the target, and it is to be fully implemented by the end of 2015 (Thai-AEC article, 2015).

In the AEC Blue Print (2008), the important characteristics of AEC establishment plan includes 4 core pillars as in Table 2.5.

**Table 2.5** Characteristic of AEC establishment

| **AEC establishment plan** | **Guideline** |
|---|---|
| 1) Single Market and Production Base | 1). Free Flow of Goods<br>2). Free Flow of Services<br>3). Free Flow of Investment<br>4). Free Flow of Capital<br>5). Free Flow of Skilled Labor |
| 2) Highly Competitive Economic Region | 1). Competition Policy<br>2). Consumer Protection<br>3). Intellectual Property Right (IPR)<br>4). Infrastructure Development<br>5). Taxation<br>6). E-Commerce |
| 3) A Region of Equitable Economic Development | 1). SME Development<br>2). Initiatives of ASEAN Integration (IAI) |
| 4) Region Fully integrated into the Global Economy | 1). Coherent Approach Towards External Economic Relations<br>2). Enhance Participation in Global Supply Chain Networks |

Source: AEC Blue Print (2008)

### 2.2.2. EU and the lessons learnt

As mentioned above, the goal of AEC is in line with the EU which is the liberalization in goods, service, investment, labor mobilization, a single market, and the standard regulation and custom harmonization. However, there still are many differences between AEC and EU.

According to Economic Intelligence Center (EIC), "Business opportunities for services sector under AEC" report in 2012, for beginning of EU started since 1958-1968, there are only 6 country member joined. The purpose was to connect the border and reduce tariffs barrier for the members. Until 1993, EU eliminated all tariffs barrier in the union and became the real free trade area. However there had not been the single market yet, so the cargo trucks had to stop at border checkpoints and go through customs process that was time and cost consuming. The completed implement of single market, free transport and no customs procedures were conducted after 1993. Thus, it totally took EU 35 years to have everything in place.

Currently, cross-border transportation of Thailand and neighbor countries still had to go through customs process and transit container due to there are still different vehicle standards in each country. There is only Laos that allows free transport but limited quota per day.

### 2.2.3. The impact of the opening of AEC on Thailand

In term of Free Flow of Goods, Thailand will have positive effects especially in term of border trade. From the report of The Secretariat of the Senate (2015) mentioned the opportunity which Thai industries can have from AEC since ASEAN countries became the major market of Thai exports sector since 2005, 19.21% proportion, growth rate of trading between Thailand and ASEAN countries increased to 30.85%, and trade value 14,452.2 million USD corresponding with statistics number of report from Information and communication technology center with cooperation of customs department (2015). Recently, exports are very important to the economy of Thailand and have upward trend in the region. From the number of exports with neighbor countries Department of Foreign Trade (2014) (January – April), it accounts for 197,913.93 million Baht or 62% of GDP increasing from the same period in previous year 4.70%. This is because Thailand fully equips with every

exports factors such as infrastructure, location, capability of production, and low production cost (Thepchatree, 2013).

In addition, in order to support the increasing of road freight transportation, there are the creations of ASEAN highway under ASEAN Framework Agreement on the Facilitation of Goods in Transit (AFAFGIT) and ASEAN Framework Agreement for the Facilitation of Inter-State-Transport (AFAFIST) to assign the members to prepare transportation routes and infrastructure to facilitate goods in transit under Protocol number 1 (Strategy plan for highway development to support AEC, Department of Highway, 2015). Master Plan on ASEAN Connectivity indicates that there are the routes to support goods in transit 6 routes associated with 8 customs houses as follow

1) Sadao Customs House (Songkla) associate with AH2
2) Padang Besar Customs House (Songkla) associate with Asian Railway
3) Chiangkhong Customs House (Chiangrai) associate with AH3
4) Maesai Customs House (Chiangrai) associate with AH2
5) Maesod Customs House (Tak) associate with AH1/AH16
6) Nongkhai Customs House associate with AH12
7) Mukdahan Customs House associate with AH16
8) Aranyaprathet Customs House (Sakaeo) associate with AH1

From agreement, cargo trucks can use only ASEAN highway with total distance 4,477 kilometer as shown in Table 2.6.

**Table 2.6** Designate transit /transport route: TTR

| **AH No.** | **Origin-Destination** | **Distance (Km.)** |
|---|---|---|
| 1 | Mae Sot (Thailand/Myanmar Border) - Tak - Bangkok - Hin Kong -Nakhon Nayok - Aranyaprathet - Khlong Luek (Thailand/Cambodia) | 702 |
| 2 | Mae Sai (Thailand/Myanmar border) - Chiang Rai - Lampang - Tak -Bangkok (West Outer Ring Road) - Nakhon Pathom - Pak Tho | 1,923 |

**Table 2.6** Designate transit /transport route: TTR (cont.)

| **AH No.** | **Origin-Destination** | **Distance (Km.)** |
|---|---|---|
| 3 | Chiang Rai - Chiang Khong (Thailand/Lao PDR Border) | 115 |
| 12 | Hin Kong - Saraburi - Nakhon Ratchasima - Khon Kaen - Nongkhai (Thailand/Lao PDR Border) | 533 |
| 16 | Tak - Phitsanulok - Khon Kaen - Kalasin - Somdet - Mukdahan(Thailand/Lao PDR Border) | 713 |
| | Nakhon Ratchasima - Kabinburi - Laem Chabang East Outer Bangkok Ring Road (Tub Chang) - Bang Pa In | 491 |
| 19 | | |
| | Total distance | 4,477 |

Source: Master plan on ASEAN Connectivity January 2011

Under ASEAN Framework Agreement on the Facilitation of Goods in Transit in protocol 4, there are technical provisions of vehicle standard which the member countries are required to follow the rules as following comparison of vehicle in each country as shown in Table 2.7.

**Table 2.7** Comparison vehicle standard in each country under AFAFGIT

| **Vehicle** | | **Thailand** | **Cambodia** | **Lao** | **Malaysia** | **Myanmar** | **Protocol4** |
|---|---|---|---|---|---|---|---|
| Width (Meter) | | 2.55 | n/a | 2.5 | 2.5 | 2.5 | <2.5 |
| Height (Meter) | | 4.2 | n/a | 4.2 | 4.2 | 3.66-4.6 | <4.2 |
| Length (Meter) | | 12 | 12.2 | 12.2 | 12.2 | 12.2 | ,12 |
| Weight (Ton) | Rigid Motor Vehicle 3 shaft | 18 / 6 tires | 25 | 24 | 26 | 21 | <21 |
| | | 21.5 / 8 tires | | | | | |
| | | 25 / 10 tires | | | | | |
| | Rigid Motor Vehicle 4 shaft | 23 / 8 tires | 30 | 25.2 | 33 | 25 | <25 |
| | | 30 / 12 tires | | | | | |

**Table 2.7** Comparison vehicle standard in each country under AFAFGIT (cont.)

| **Vehicle** | | **Thailand** | **Cambodia** | **Lao** | **Malaysia** | **Myanmar** | **Protocol4** |
|---|---|---|---|---|---|---|---|
| Weight (Ton) | Articulated 4 sharft | 35 | 35 | 30 | 37 | n/a | <32 |
| | Articulated 5 sharft | 45 / 18 tires | 40 | 37.4 | 40 | n/a | <36 |
| | Articulated 6 sharft | 50.5 / 22 tires | 40 | 40 | 44 | n/a | <38 |

Source: Department of land transport

From above comparison of vehicle in each country and technical provision protocol 4 in Table 10 can summarize as follow:

1) Width: Thailand is only one country who has width exceeding the provision. Thailand provision is 2.55 meters but protocol 4 is 2.5 meters.

2) Height: Myanmar is only one country who has height exceeding provision. Myanmar provision is 3.66-4.66 meter but protocol 4 is 4.2 meter.

3) Length: Cambodia, Lao, Malaysia, and Myanmar have length exceeding the provision, the length of 4 countries are 12.2 meters while the protocol is only 12 meters.

4) Weigh: Thailand, Cambodia, Lao, and Malaysia have weight exceeding the provision in every type of vehicle.

From the comparison result can be seen that when consider the dimension of Thai vehicle is wider than ASEAN standard which may have a problem with Thai transporter who want to get the cross border permission in the other countries.

According to above information, Table 2.8 indicate to significantly growth of border trade during 2015-1019, more of border trend to increase 13-17% due to the changing of software such as laws, rules and hardware such as communication infrastructure. However, after 5 years AEC opened, the percentage of growth will gradually reduce until 2024 by forecasting.

**Table 2.8** Growth rate expectation of border trade in Thailand

| No. | Border Zone | Growth Rate per Year (%) | | |
|---|---|---|---|---|
| | | 2019 | 2024 | 2034 |
| 1 | Chiangsaen Customs House | 13.8 | 8.9 | 8 |
| 2 | Fourth Thai–Lao Friendship Bridge Customs House | 17.1 | 10.7 | 9.7 |
| 3 | Huai Kon Customs House | 13.8 | 8.9 | 8 |
| 4 | First Thai–Lao Friendship Bridge Customs House | 13.8 | 8.8 | 8 |
| 5 | Fifth Thai–Lao Friendship Bridge Customs House | 13.7 | 8.9 | 8 |
| 6 | Third Thai–Lao Friendship Bridge Customs House | 15.4 | 9.8 | 8.9 |
| 7 | Second Thai–Lao Friendship Bridge Customs House | 17.1 | 10.7 | 9.7 |
| 8 | Sixth Thai–Lao Friendship Bridge Customs House | 14.6 | 9.3 | 8.4 |
| 9 | Chongmek Customs House | 14.6 | 9.3 | 8.5 |
| 10 | Chong Sa-Ngam Customs House | 15 | 9.2 | 8.4 |
| 11 | Chong Chom Customs House | 15 | 9.2 | 8.4 |
| 12 | Khlong Luek - Poipet Customs House | 17.4 | 10.5 | 9.7 |
| 13 | Klongyai – Koh Kong Customs House | 15 | 9.2 | 8.4 |
| 14 | Sungaikolok Customs House | 6.3 | 5.9 | 5.8 |
| 15 | Sadao Customs House | 7 | 6.1 | 7 |
| 16 | Padang Besar Customs House | 7 | 6.1 | 7 |
| 17 | Maesai - Tha Khi Lek Customs House | 12.8 | 8.4 | 8.2 |
| 18 | Mae Sot – Myawaddy Customs House | 13.6 | 8.9 | 8.5 |
| 19 | Chedi Sam Ong Custom House | 12.8 | 8.4 | 8.2 |
| 20 | Ban Phu Namron Customs House | 17.1 | 11 | 10.5 |

Source: Department of highway

Considering based on area, it can be seen that border zone which locates in GMS economic corridor will have high growth rate in border economy. Another

interesting zone is Ban Phu Namron, Kanjanaburi, by this forecast base on assumption, if Dawei Special Economic Zone (SEZ) have been successful.

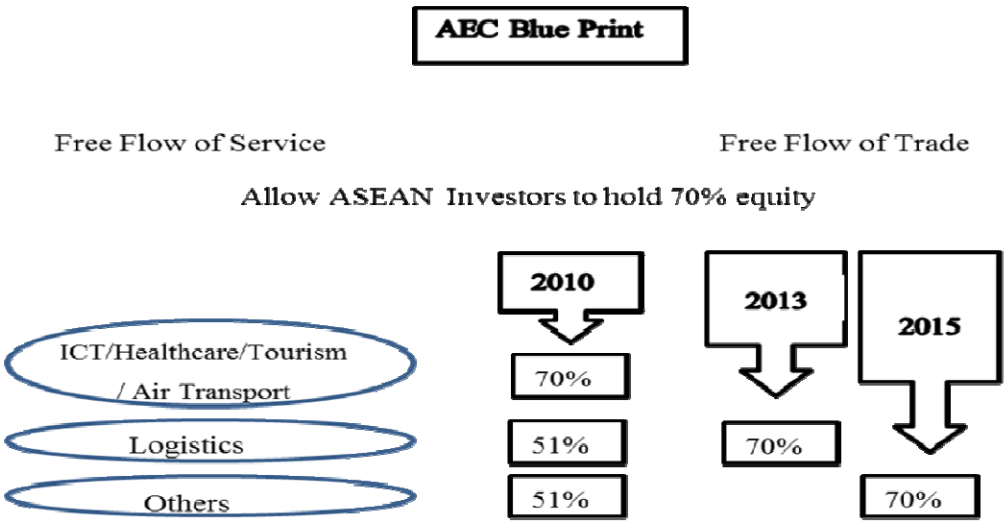


**Figure 2.4** Timeline of Liberalization Plan

Source: Department of Trade Negotiations, Ministry of Commerce

With the term of investment, the reduction of barrier of investment is allowed up to 70 percent of equity for foreign investor in each industry as shown in Figure 2.4. This policy is the great opportunity for ASEAN investors for the free moving in the region, and it will be easier to access capital and gain benefit from this liberalization of goods, services and investment. Furthermore, this advantage will encourage and challenge external investors to have more confidence to do business in the region.

Mr. Chadchard Sittipan, Deputy Minister of Communication revealed in article Thai-AEC (2012) that the liberalization of the transport sector, and local LSP would be directly affected especially from the outbound road freight transportation. Hence, the entrepreneurs needs to prepare for the liberalization of transport in 2013 due to changing of regulation according to AEC timeline allowing foreign investors to hold 70% from 49% equity in logistics industry. If the entrepreneurs still lacks of logistics ability, the competitors will take over the market share and the position.

## 2.3. Risks in penitential logistics service for road freight transportation

### 2.3.1. Risk definition

In the literature review, there are many definitions of risk but most authors wrote in term of severity from unexpected event. Risk is uncertainty of situations or events which can negatively affect the performance of organization. Risk is also the events that have a few probabilities to happen but can harm the organization both in short term and long term (Tang and Musa, 2010). Jenkins et al. (2010) defined risk and harm as a probability of occurring the damage which is the consequence from loss in operations. Risk is an unpleasant event and it is hard to know that when it will arise in the future and disrupt flow of supply chain (Water, 2007). Source of risk event can be categorized in big 2 types from internal instability in organization to external environment (Goh et al., 2007). Konecka (2008) studied risk with globalization and classified the source into 3 factors namely familiarity risk (working in different region), risk from too long supply chain, and risk from trade barrier. Kersten et al. (2012) classified source of transport risk into 5 categories namely truck driver, company, truck, environment, and political. Jüttner et al. (2003) categories risk source into 3 types namely environment, network, and organization as shown in Figure 2.5.

Jenkins et al., (2010) and Rao and Goldsby (2009) presented risk management process can divide to 3 steps as follow

### 2.3.2. Risk assessment

Risk assessment is a step to define problem or answer to the risk question which has 4 fundamental questions as following:

1.) What can go wrong?
2.) What is probability it will go wrong?
3.) What are consequences (severity)?
4.) What is the detectability?

Risk assessment includes 3 fundamental steps as shown in Figure 2.6.

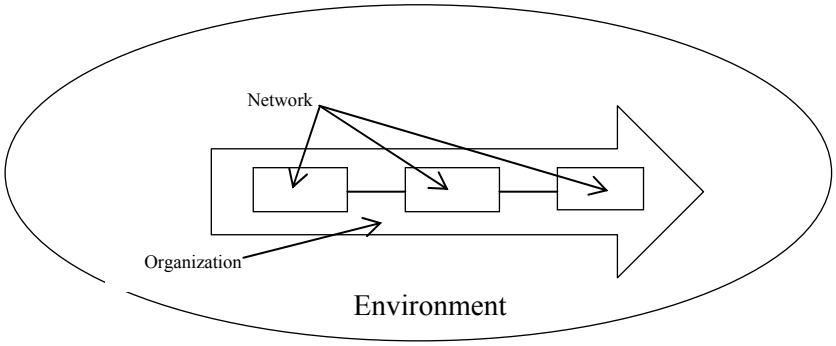


**Figure 2.5** Risk Source

Source: Adapted from Jüttner et al. (2003)

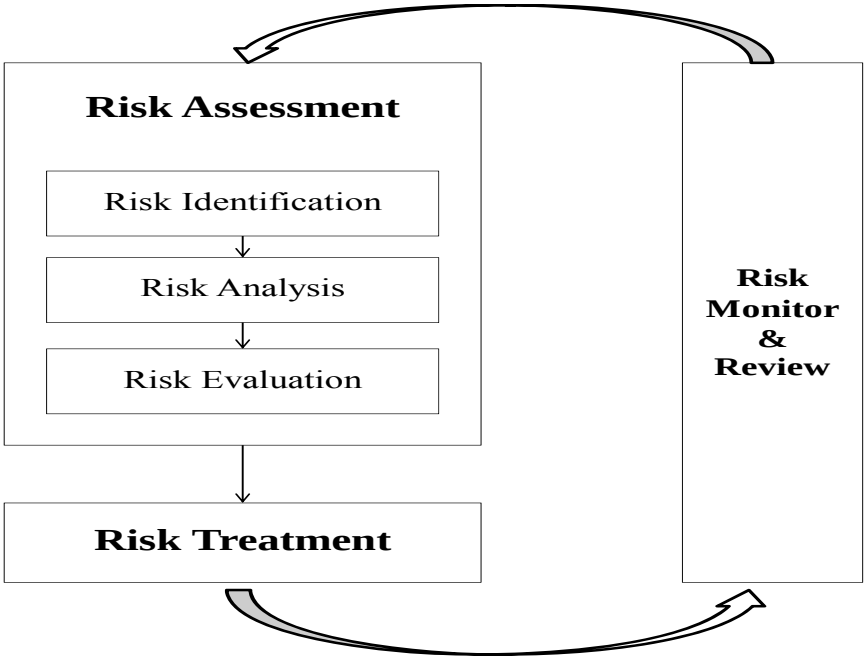


**Figure 2.6** General Risk Management Process

Source: Base on model of Jenkins et al., (2010) and Rao and Goldsby (2009)

2.3.2.1. Risk Identification:

Risk identification is an important initial step of risk assessment .The purpose of risk identification is to identify the potential of severity or

negative events which relate to those 4 fundamental questions. First step of risk identification is to start from breaking down process to scope of framework and focusing on appropriate data or information from process to come up risk event which can harm organization. Brainstorming is one of popular and useful systematic way to identify risk event and risk agent by answering in each step of the question, “What can go wrong?”

2.3.2.2. Risk Analysis

This is the step to determine the levels of risk, severity of each risk agent and probability of occurrence. The question is if the risk happened, what the consequence and severity by using numeral scale to assess and prioritize level of risk are. For example, risk equation is:

Risk= Severity x Likelihood of Occurrence

2.3.2.3. Risk Evaluation

This step is to evaluate risk significant or determine the acceptability by using numeral information from risk analysis to make the decision whether to manage, to mitigate, to use contingency plan to each risk, or to accept or reduce it.

### 2.3.3. Risk Treatment

In this step, the purpose is to monitor the action to mitigate or eliminate risk to acceptable level. The controlling of risk should answer following 5 questions:

1) Is the risk above an acceptable level?
2) What can be done to reduce or eliminate risk?
3) What is the appropriate balance among of benefit, risk, and resource?
4) Are new risk introduce as a result of identified risk being control?

To classify level of risk, Rao and Goldsby (2009) showed 2 ways to manage the risk, reduce (treating, avoiding, or transferring), or accept (tolerating), as shown in Figure 2.7.

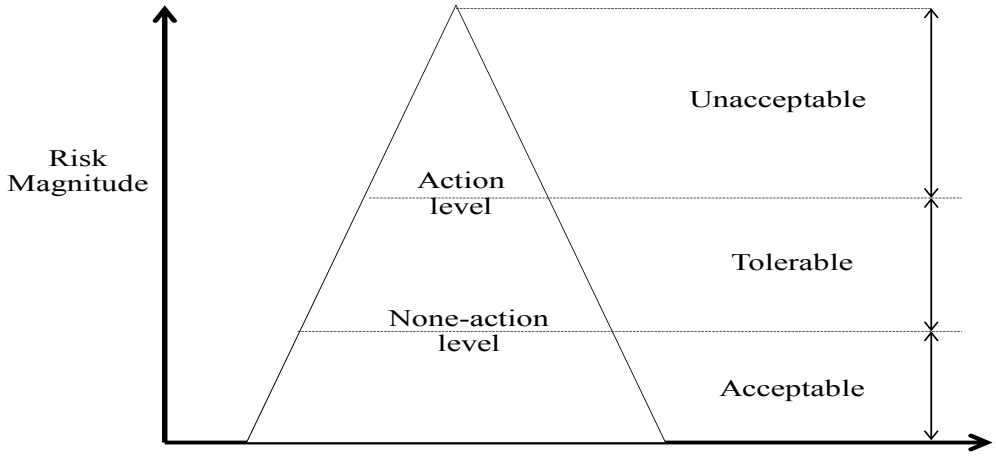


**Figure 2.7** Risk level (Acceptable, Tolerable, or Unacceptable)
Source: Rao and Goldsby (2009)

### 2.3.4. Risk Review

This step is to review or assess the result of performance which had been done in risk management. It could be assessed with the following criteria:

- If the assessment was effective or not.
- What the consequences from risk mitigation are.
- What wrong with the problem solving.

### 2.3.5. Related literature on risk management

Pujawan and Geraldin (2009) prioritized risk by using model "House of Risk" to investigate supply chain risk based on case study of Fertilizer Company in Indonesia. Risk events were identified by SCOR model with respect to plan, source, make, deliver, and return. Berle et al. (2013) purposed the assessment and flexibility of Transportation sector based on Liquidity Natural Gas (LNG) cargo by creating quantitative risk measurement and optimal mitigation plans with Monte Carlo simulation. 4 scenarios of important risk were divided into 12 mitigation plans to see the most optimize way to reduce risk. Caputo et al. (2011) studied impact of accident risk on road transportation based on hydrogen cargo. Cost transportation model integrated with risk analysis was used to find the severity of cost if the accident occurred. Yang (2011) presented risk management of Taiwan maritime supply chain security in the field of container security initiative (CSI) according to 24-hr. rule. This

study categorized risk into 3 types namely operational risk, physical risk, and financial risk. Each risk event was identified from exports process. Moreover, the mitigation strategy was illustrated through bowtie diagram within 3 scenarios: loss prevention, loss reduction, and in case of avoidance or non-insurance transfer. Rao and Goldsby (2009) stated the assessing and managing risk by using The Supply Chain Risk Management Process (SCRMP). In their research, the authors divided risks into 10 categories namely demand, delay, disruption, inventory, manufacturing, capacity, supply, system, strategy, and transportation. Harland et al. (2002) defined 6 types of losses and described consequence from risk event which has probability to occur in supply chain network. The losses are financial loss, performance loss, physical loss, psychological loss, social loss, and time loss. Moreover, authors also identified categories of risks and the description by aggregated previous research involving with risk management including strategic risk, operation risk, supply risk, customer risk, asset impairment risk, competitive risk, reputation risk, financial risk, fiscal risk, regulatory risk, and legal risk. Benchaley (2000) illustrated the aspect of risks in cargo transportation in each event in term of benefit, exposure, event, consequence, business impairment, and magnitude of loss. Chopra and Sodhi (2004) investigated risk management in supply chain in order to manage risk and to avoid or mitigate breaking down of supply chain system. In their study, authors defined category of risk into 9 groups namely disruption, delay, systems, forecast, intellectual property, procurement, receivable, inventory, and capacity. Furthermore, the study suggested the mitigation strategy by represented the relation between mitigation solution and risk categories. In order to trade-off, the risk categories are dependent. The mitigation of one risk category can affect other risks categories. Gaudenzi and Borghesi (2006) presented the AHP model in order to evaluate supply chain risk by set the target at customer's requirement to be objective. The supply chain objectives were defined within 4 elements: time delivery, order complete, order correctness, and damage/ defect free. In order to scope the area for risk assessment and then, risk event was identified base on supply chain objective and also shown by the correlation of each risk factor. Liangrokapart (2012) studied Supply Chain Impact Analysis using a case study of hospital supply chain disruptions in Thailand. Pires et al. (2013) investigated supply chain risk in Brazilian automotive industry by focusing on system failure from

disruption. Chen et al. (2013) studied risk avoidance from supply chain disruption in last 10 years focusing on bullwhip affect. Schroeder and Gomes (2014) summarized risks event in international trade by focusing on operation process and also suggest for mitigation strategies. Kersten et al (2012) grouped road transport risks as time, cost, and quality and also suggested mitigation strategy by classified risks to general risk and procurement risk (sub-category). Water (2007) classified 2 basic risks from 2 sources namely internal risk focusing on operation and external risk focusing on uncontrollable event such as natural disaster etc. Jüttner et al. (2003) focused on operation risk from complexity of supply chain network.

Department of transport, Cranfield university (2003) mentioned risk management of logistics provider whether the logistics operators still run on the operation and are responsive to the risk day by day. There are no formally research considering on risk management, or the research does not attempt to figure out the quantitative result on probability of occurrence, severity if occur as well as mitigation strategy to support decision making of logistics companies. The logistics companies only used a tool or model to estimate the impact of loss if something goes wrong within their customer's network. Likewise, report from ABNAMRO January (2015) on LSP industry, more than 90 percent of the LSPs and transport companies claim to be aware of their principal operational and strategic risks. However, only 61 percent of those have alternative plan in place in case of a major breakdown in their operations. Just lower 50% of the companies express the business implications in monetary terms. This means that the Transport and Logistics sector is on the right track; now they need to take the next step toward adopting a more mature approach to risk management. Companies should systematically map out risks that might affect their business objectives and formalize their control measures.

From risk review, the summaries of literature review from each author are shown in Table 2.9 and Table 2.10 shows the categories of risk that each author mentioned.

**Table 2.9** Summarize risk review

| **Authors** | **Title** | **Tools** | **Risk factors identification** |
|---|---|---|---|
| Tummala and Schoenherr (2011) | Assessing and managing risks using the Supply Chain Risk Management Process (SCRMP) | Literature Review/ SCRMP Theory | Inaccurate forecasts, seasonality, swing demand, excessive handling due to border crossings or change in transportation mode, traffic congestion, problem with customs clearance, vehicle breakdown, natural disaster, labor dispute, supplier bankrupt, exchange rate fluctuation, information infrastructure breakdowns, lack of appropriate IT, regional instability, government regulation, intellectual property breaches, |
| Schroeder and Gomes (2014) | Supply chain risk management in international trade operations between Germany and Brazil | Literature Review/ Experts Interview | Thief of product during delivery, product damage during transport, forecasting error, delay delivery, staff shortage skill, poor IT system |
| Yang (2011) | Risk management of Taiwan's maritime supply chain security | Literature Review/ Interview /loss exposure matrix/ Bowties Diagram | Longer lead time data entering, various transmission system, increasing security of exports barrier, double inspection, longer cargo handing time, additional document charge, |
| Tang and Musa (2010) | Identifying risk issues and research advancements in supply chain risk management | Literature Review/citation/ co-citation analysis | N/A |

**Table 2.9** Summarize risk review (cont.)

| Authors | Title | Tools | Risk factors identification |
|---|---|---|---|
| Jüttner et al. (2003) | Supply chain risk management: outlining an agenda for future research | semi-structured interviews/ Literature Review | Politic problem, natural disaster, blurring boundary in supply chain parties, demand uncertainty, labor strike, IT system uncertainty |
| Harland et al. (2002) | Risk in supply networks | Literature Review | Breaching traffic rule and accident during transport |
| Nordfjærn and Rundmo (2014) | Personality, risk cognitions and motivation related to demand of risk mitigation in transport among Norwegians | Literature Review/ Questionnaire/ Statistical Theory | Transportation Risk to People Awareness |
| Gaudenzi and Borghesi (2006) | Managing risks in the supply chain using the AHP method | AHP | Delay on time delivery, manufacturing delay, damage goods during handle, inaccurate goods loading, and lack of integration with supplier |
| Caputo et al. (2011) | Impact of accidents risk on hydrogen road transportation cost | Literature Review/ Transportation cost models/ Risk Analysis Model | N/A |
| Berle et al. (2013) | Optimization, risk assessment and resilience in LNG transportation systems | Formal Vulnerability Assessment (FVA)/ Simulation | Operation delay and overload capacity |

**Table 2.9** Summarize risk review (cont.)

| Authors | Title | Tools | Risk factors identification |
|---|---|---|---|
| Chopra and Sodhi (2004) | Managing Risk to Avoid Supply Chain Breakdown | Literature Review/ Interview | Natural disaster, labor dispute, supplier bankrupt, excessive handling in border area, information infrastructure breakdown, bullwhip effect, and exchange rate fluctuation |
| Kersten et al (2012) | Risk management in logistics: Empirical results from the Baltic Sea Region from 2010 until 2012 | Survey/ Work Shop of Focus Group/ Expert Interview | Staff performance responsibility, natural disaster, bad road condition, traffic jam, delay due to problem with customs, loss of goods during transport, incorrect loading, inadequate truck, vehicle too old, vehicle breakdown, lack of maintenance vehicle, truck weight overload, too long custom process, too long document process, breakdown customs system, and problem with regulation in border area |
| Rao and Goldsby (2009) | Supply chain risks: a review and typology | Literature Review | Market uncertainty, political uncertainty, natural uncertainty, and mistake decision making |
| Manuj and Mentzer (2008) | Global Supply Chain Risk Management | Literature Review | N/A |
| Pires et al. (2013) | Supply Chain Risk Management in the Brazilian automotive industry: a case study | Literature Review/ Interview | Supplier unable to serve requirement, lack of predictive maintenance, and highways and cities overloaded with vehicles across the country |

**Table 2.9** Summarize risk review (cont.)

| Authors | Title | Tools | Risk factors identification |
|---|---|---|---|
| Rogers et al. (2013) | Supply chain risk management in India – practical insights | Semi-structured questionnaire/ SPSS | Natural disaster, cross cultural, and inaccurate forecast |
| Konecka (2008) | Supply chain risk management in the aspect of globalization | Literature Review | Natural disaster, demand uncertainty, world economic crisis, changing of border regulation, and political uncertainty |
| Pujawan and Geraldin (2009) | House of risk: a model for proactive supply chain risk management | Literature Review/SCOR/ Brainstorming/ House of Risk Model | Significant increase of demand, too long technical evaluation, natural disaster, seasonality factor, labor strike, exchange rate fluctuation, supplier bankrupt, problem with customs clearance, messiness in the storage area, and breakdown IT system |
| Water (2007) | Supply Chain Risk Management Vulnerability and resilience in logistics | Literature Review | Delay delivery, poor forecast, accident, human error, system failure, natural disaster, and problem with partner. |
| Chen et al. (2013) | A case study on risk-averse supply continuity management through information sharing and postponement | Review information from secondary source and previous case studies | Natural disaster, bullwhip effect, global economics crisis, and political uncertainty |

Note: N/A mean the research investigated only risk categories, did not focus on the specific risk factors or risk events.

**Table 2.10** Risk categories from literature review

| **Authors** | **Disruptio** | **Capacity** | **Delay** | **System** | **Operatio** | **Finance** | **Political** | **Market** | **Regulatio** | **Strategy** |
|---|---|---|---|---|---|---|---|---|---|---|
| Tummala and Schoenherr (2011) | x | x | x | x | x | | x | | | |
| Schroeder and Gomes (2014) | x | | x | x | x | | | | | |
| Yang (2011) | | | | | x | x | | | | |
| Tang and Musa (2010) | x | x | | | x | | x | | | |
| Jüttner et al. (2003) | x | | | x | x | | x | | | |
| Harland et al. (2002) | x | | | | x | x | | x | x | x |
| Nordfjærn and Rundmo (2014) | | | | | x | | | | x | x |
| Gaudenzi and Borghesi (2006) | | | x | | x | | | | | |
| Caputo et al. (2011) | x | | x | | x | | | | | |
| Berle et al. (2013) | | x | x | | x | | | | | |
| Chopra and Sodhi (2004) | x | x | x | x | x | | | x | | |
| Kersten et al (2012) | x | x | x | x | x | | | x | | |
| Rao and Goldsby (2009) | x | | | | x | | x | | | x |
| Manuj and Mentzer (2008) | x | | x | x | x | x | | x | | |
| Pires et al. (2013) | x | x | | | x | | | | | |
| Rogers et al. (2013) | x | | | x | x | | | | | |
| Konecka (2008) | x | | x | | x | x | x | | x | |
| Pujawan and Geraldin (2009) | x | x | x | x | x | | | | | |
| Water (2007) | x | | x | x | x | x | | | x | |
| Chen et al. (2013) | x | | | x | x | | | | | |

## 2.4. Methodology to find the optimal mitigation strategy

According to research objectives, this study is going to prioritize the risk factor and select the most appropriate mitigation strategy to control each risk. Analytical Hierarchy Process (AHP) is one of analytical tool to support decision making developed by Saaty in 1970 for executive determination. The advantage of AHP is suitable for multi-criteria decision making and became popular tool in the present (Lequna et al., 1999). According to Flug et al. (2000) and Sahoo et al. (2001) to select to best alternative, the AHP uses the pairwise comparison to consider the important of each criterion. AHP is simply tools to evaluate criteria and easy for mathematically implement (Semih and Seyhan, 2011). Hence, AHP is appropriate to apply with this research to select the appropriate strategy to mitigate the risks. There are 3 major steps to consider for AHP.

### 2.4.1. Structuring the Hierarchy

The concept of AHP is to divide the structure of problem into levels. First, it is goal, criteria, sub-criteria, and alternative respectively Saaty (1980).

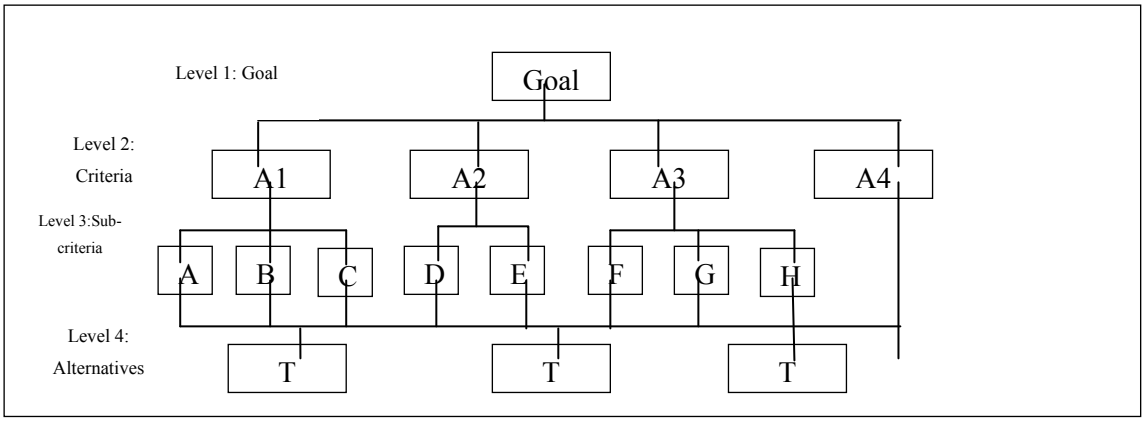


**Figure 2.8** AHP Model
Source: Saaty (1980)

Figure 2.8 shows in example criteria chart by the numbers of levels are depend on the complexity of problem determination which can explain as following

1) Level 1 represents the focus or goal to make the decision.

2) Level 2 represents the criteria which influence to decision making. For this study, criteria mean categories of risks.

3) Level 3 represents sub-criteria. The numbers of sub-criteria depend on the clarity of criteria. In this study, sub-criteria mean risk factors.

4) Level 4 is the last level. It is an alternatives to be considered

### 2.4.2. Calculation of Relative Priority

Due to the significant of each criterion is different, the significant of each criterion must be weighted by experts or executive or related person based on their expertise and experience before assessing the alternative as shown in Table 2.19.

**Table 2.11** Pairwise comparison scale

| **Qualitative** | **Quantitative** |
|---|---|
| Equally Preferred | 1 |
| Equally to Moderately | 2 |
| Moderately Preferred) 3 | 3 |
| Moderately to Strongly | 4 |
| Strongly Preferred | 5 |
| Strongly to Very Strongly | 6 |
| Very Strongly Preferred | 7 |
| Very Strongly to Extremely | 8 |
| Extremely Preferred | 9 |

Source: Huizingh and Virolijk, (1994)

**Table 2.12** Pairwise comparison matrix for decision making

| **Criteria** | | **Factors** | | | |
|---|---|---|---|---|---|
| | | **A1** | **A2** | **A3** | **A4** |
| **Factors** | **A1** | $A_{11}$ | $A_{12}$ | $A_{13}$ | $A_{14}$ |
| | **A2** | $A_{21}$ | $A_{22}$ | $A_{23}$ | $A_{24}$ |
| | **A3** | $A_{31}$ | $A_{32}$ | $A_{33}$ | $A_{34}$ |
| | **A4** | $A_{41}$ | $A_{42}$ | $A_{43}$ | $A_{44}$ |

Source: Thailand Productivity Institute

According to above matrix, $A_{ij}$ is the relation between row i and column j or the result of significant comparison between factor $A_i$ and $A_j$. Each number of scale will indicate different meaning.

### 2.4.3. Consistency

According to the calculation of relative priority, the opinion of executive or experts may have some bias or error. Hence, the consistency index (CI) should be validated. If value of CR > 0.1, it indicates that the significant value of pairwise comparison is inconsistent, so it needs to be adjusted the significant value again before moving to the next step (Huizingh and Vrolijk, 1994). When the CI is acceptable, it is time to assess the alternative by decision criteria to prioritize. Then, the most suitable alternative can be selected. The equation to calculate CI is shown as following

CR = CI/RI

CI: Consistency Index

CR: Consistency Ratio

RI: Random Inconsistency Index, the summarize is shown in Table

CI = (λmax – n)/ n-1

n: Size of Square Matrix

λmax: Maximum eigenvalue

**Table 2.13** Random Inconsistency Index (RI)

| N | RI | N | RI | N | RI |
|---|---|---|---|---|---|
| 1 | 0 | 6 | 1.24 | 11 | 1.51 |
| 2 | 0 | 7 | 1.32 | 12 | 1.48 |
| 3 | 0.58 | 8 | 1.41 | 13 | 1.56 |
| 4 | 0.9 | 9 | 1.46 | 14 | 1.57 |
| 5 | 1.12 | 10 | 1.49 | 15 | 1.59 |

Source: (Sahoo, 1998)

### 2.4.4. AHP in previous researches

Chan (2003) showed the use of AHP technique by case study of electronics industry. This paper presented a simple measurement of supply chain performance both quantitative and qualitative (AHP) method. In conclusion, the paper

contributes the advantage of AHP to support decision making of manager for multi-criteria and to prioritize performance. Vudhivanich (2001) presented the case study of Royal Irrigation Department of Thailand which studied and improved irrigation system. AHP tool was used for analysis in order to select the best alternative from 4 projects. Gaudenzi and Borghesi (2006) selected AHP model to investigate risk factors and find out the most critical of risk factors or risk prioritization. The paper defined customer value in supply chains and the improvement to reach customer satisfaction. Al-Harbi (2001) used AHP to support decision making in management project for contractors selection by trade-off the prequalification of each criterion. The final results of the study are criteria and priority for project manager determination. Silva et al. (2010) applied AHP application to prioritize multi-criteria of R&D project in aerospace sector in Brazil. The paper considered the complex criteria problem to select the project. To select the appropriate project, the alternatives were prioritized. Semih and Seyhan (2011) implemented the gas station site selection by using AHP to analyze multi-criteria complex problem.

Beck (2013) studied a multiple criteria decision support by literature review from the publish year of 2001. Table 2.22 represents the trend of using each method. AHP has become significantly increased in recent year.

**Table 2.14** Multi-criteria decision making method per year

| Method | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1) AHP | 3 | 1 | 5 | 3 | 5 | 5 | 10 | 19 | 8 | 8 | 6 | 75 |
| 2) Fuzzy set theory | | | 3 | 1 | 1 | 7 | 5 | 9 | 7 | 5 | 10 | 48 |
| 3) ANP | | 1 | 1 | 1 | | 2 | 1 | 2 | 2 | 5 | 2 | 17 |
| 4) Global programming | | | 1 | 2 | 1 | 1 | | 2 | 3 | 2 | | 12 |

**Table 2.14** Multi-criteria decision making method per year (cont.)

| Method | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5) DEA | | | | | | | | 1 | | 2 | 2 | 5 |
| 6) Integer linear programming | 1 | 1 | | | | | | 1 | 1 | 1 | | 5 |
| 7) Multi-obj. linear programming | | | | | | 2 | | 2 | | 1 | | 5 |
| Total | 4 | 4 | 11 | 9 | 13 | 24 | 24 | 45 | 28 | 30 | 28 | 222 |
| Method to article ratio | 1.33 | 1.33 | 1.57 | 1.8 | 1.86 | 1.6 | 1.85 | 1.8 | 2 | 2 | 1.87 | 1.79 |

Source: Beck (2013)

**Table 2.15** Overview SCM application areas

| Specific application area | Paper count | Most applied method or method combination |
|---|---|---|
| Supplier selection | 44 | AHP & Fuzzyset theory |
| Supplier evaluation | 6 | AHP |
| Software selection | 2 | AHP |
| Supplier risk assessment | 2 | AHP |
| Total | 54 | AHP, AHP & Fuzzy set theory |

Source: Beck 2013

Table 2.23 shows the use of each application in previous studies. It indicates that AHP is the popular tool and can be used to apply with any supply chain management area.

**Table 2.16** Overview SCM application in logistics areas

| **Specific application area** | **Paper count** | **Most applied method or method combination** |
|---|---|---|
| 3 PRLP selection | 6 | AHP & Fuzzy set theory |
| 3PL selection | 5 | AHP |
| Agile SC | 2 | ANP, Fuzzy set theory |
| 4PL evaluation | 1 | Choquet integral |
| Customer service management | 1 | Fuzzy set theory ANP |
| SC effectiveness | 1 | ANP |
| Selection of global logistics | 1 | AHP & Fuzzy set theory |
| Supply chain development | 1 | AHP |
| Total | 18 | AHP, AHP & Fuzzy set theory |

Source: Beck (2013)

In the area of logistics management, AHP is also a popular tool to support decision making as shown in Table 2.24 and the result also corresponds to Sipahi and Timor (2010) who reviewed more than 600 papers during 2005-2009. They found that AHP is the most popular in any area. When the transportation industry is taken into account, AHP still has high proportion comparing with others as seen in Table 2.25.

**Table 2.17** Classification by application area and methodology

| Area | AHP | ANP | Fuzzy AHP | Fuzzy ANP |
|---|---|---|---|---|
| Manufacturing industry | 45 | 2 | 23 | 1 |
| Environmental management and agriculture | 24 | 0 | 1 | |
| General decision problem | 12 | 2 | 3 | 1 |
| Power and energy industry | 14 | 0 | 1 | |
| Transportation industry | 12 | 1 | 2 | |
| Construction industry | 8 | 1 | 1 | |
| Health | 10 | 0 | | |
| Others | 44 | 3 | 11 | |
| Total | 169 | 9 | 42 | 2 |

Source: Sipahi and Timor (2010)

**Conclusion**

The literature review and related research represent that the coming of AEC will influence Thailand significantly. The free trade and liberalization transportation will make the demand of transportation across the border increasingly. It is very important factors for economic development of Thailand. Moreover, the consequence of AEC will attract foreign logistics companies coming to get the market share and compete with the local LSPs. Hence, the gap from literature is to survive the fierce competition by improving ability to meet customer requirement as well as maintaining the market share. Therefore, Risk management is one of crucial point of ability improvement for logistics provider to be ready for full implementation of AEC at the end of 2015.

# CHAPTER III
# RESEARCH METHODOLOGY

In this chapter, the study will be discussed based on three critical components namely:

3.1 Research Framework

3.2 Research Methodology

3.3 Research Schedule

## 3.1 Research Framework

From the literature review, the opening of AEC at the end of 2015 will have direct affect to logistics service providers in Thailand. In the positive site, the new regulation will stimulate demand of intra-regional trading. It is very important factors for economic development of Thailand especially in exports sector. Hence, outbound road freight transportation which is the major mode to connect with neighboring countries will be influenced to increase significantly. In the negative site, the consequence of AEC will attract foreign logistics companies coming to get the market share and compete with the current LSPs in Thailand. Hence, local LSPs should adjust and improve their ability in order to maintain their market share and position in supply chain network. Furthermore, the threatening of multinational logistics providers creates a lot of risk for Thai logistics service companies. Thai companies need to reduce the risks which may occur and disrupt the company performance and have negative impact to the local companies, performance and operation. To mitigate the risks, 4Ts strategies will be applied to suggest the avenue for mitigating risks.in order to enhance working ability of local logistics provider in Thailand as shown in research framework in Figure 3.1.

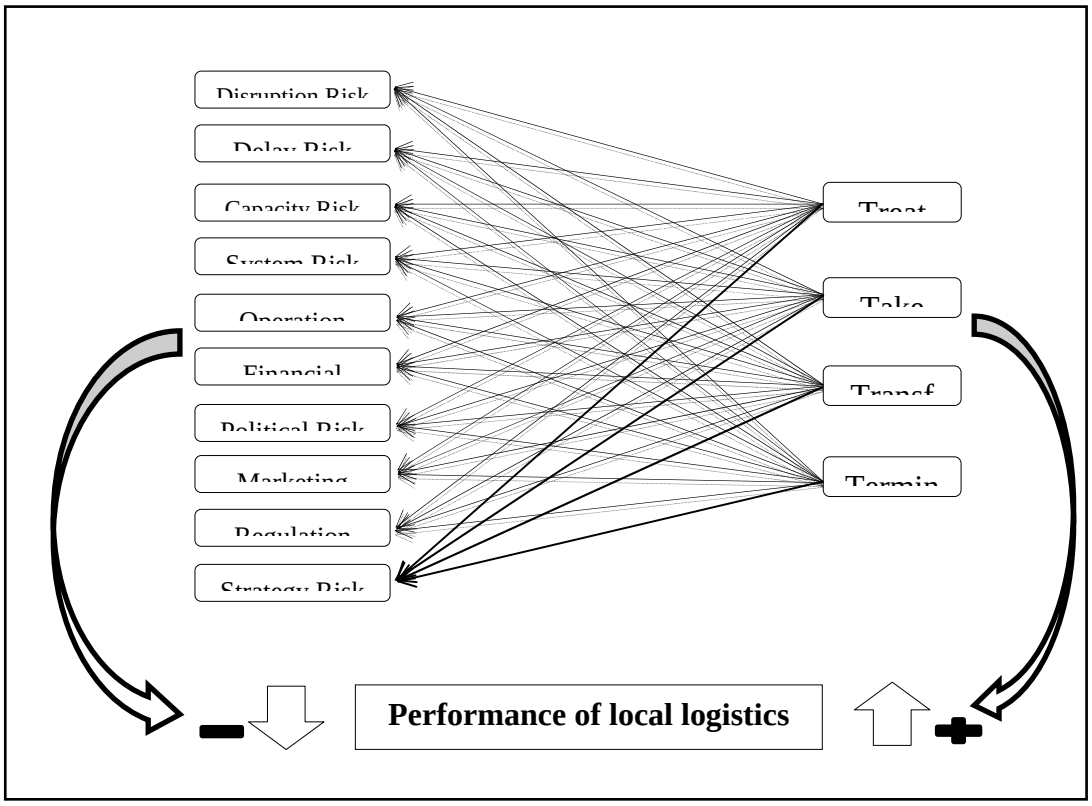


**Figure 3.1** Research Framework

## 3.2 Research Methodology

To reach the objectives, firstly, the methodology is defined within 7 steps by road freight transportation risk management. Each step contains three phasesmanely research steps, methods, and outcomes shown in Figure 3.2

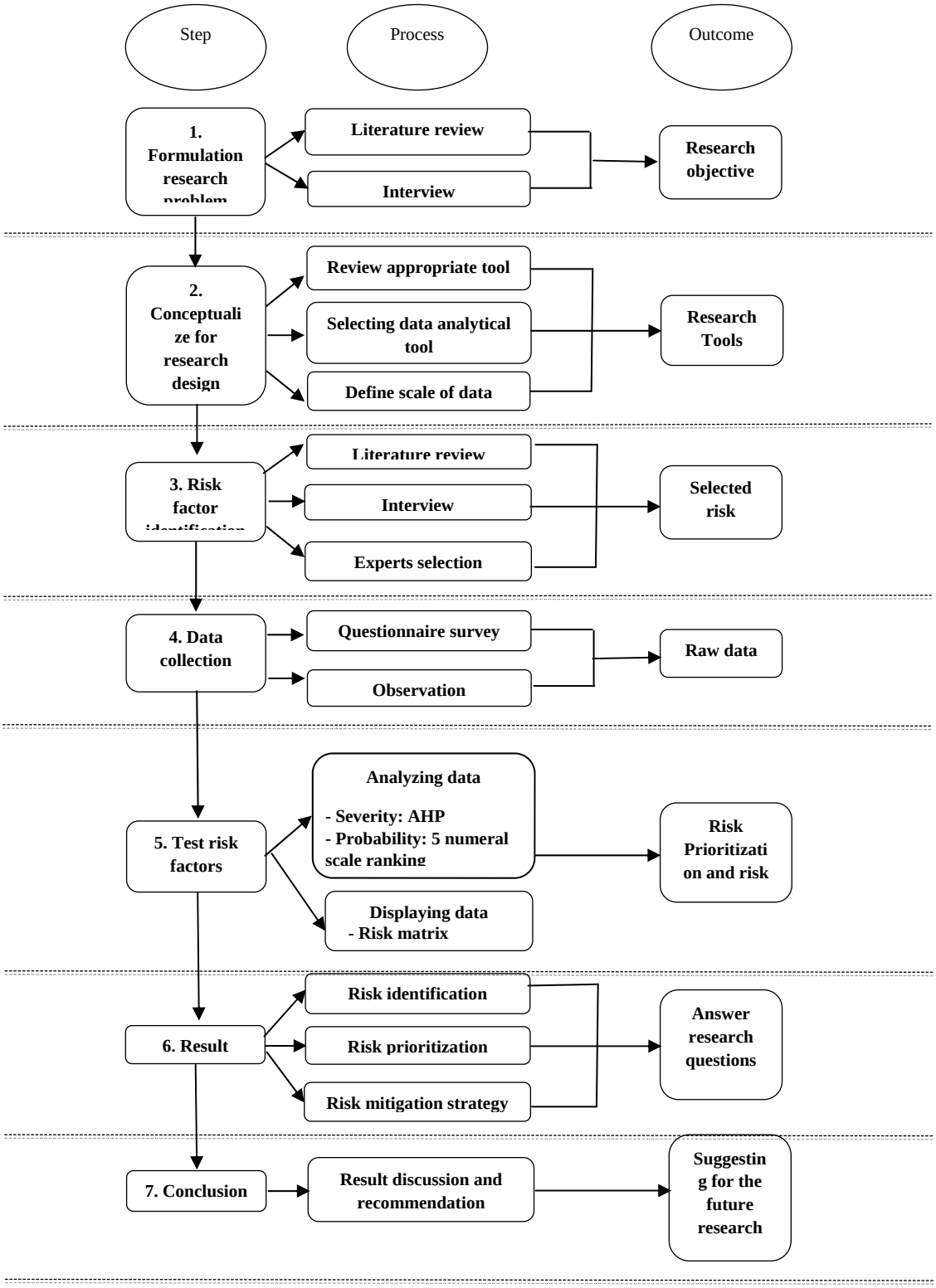


**Figure 3.2** Research Methodology

**1. Formulation research problem**

This is qualitative method. The problem is identified mainly from the preliminary literature with secondary data. The literature is mainly related to current problem of outbound road freight transportation which both local and international logistics service provider is facing as well as the impact from the opening of AEC to LSPs in Thailand. The literature is reviewed aiming to formulate problem statement and research objective.

**2. Conceptualize for research design**

After research objectives have been defined, this research was designed in order to select appropriate analytical tool. This step implemented with qualitative method by using secondary data, reviewed the using of each analytical tool in previous literatures which associate with research objective.

In this study divided risks into 2 dimensions namely severity and probability of occurrence. In term of severity, Analytic Hierarchy Process (AHP) is used for the analysis. AHP is one of the techniques in decision making used to obtain the best alternative (Flug et. al., 2000; Sahoo et. al., 2001). The AHP will use the pairwise comparison to consider the important of each criterion. Therefore, the advantage of AHP is suitable for multi-criteria decision making and becomes popular tool nowadays (Lequna et. al., 1999). Hence, AHP is appropriate to apply with this research to obtain the appropriate strategy to mitigate the risks. The AHP framework for risk mitigation is shown in Figure 3.3.

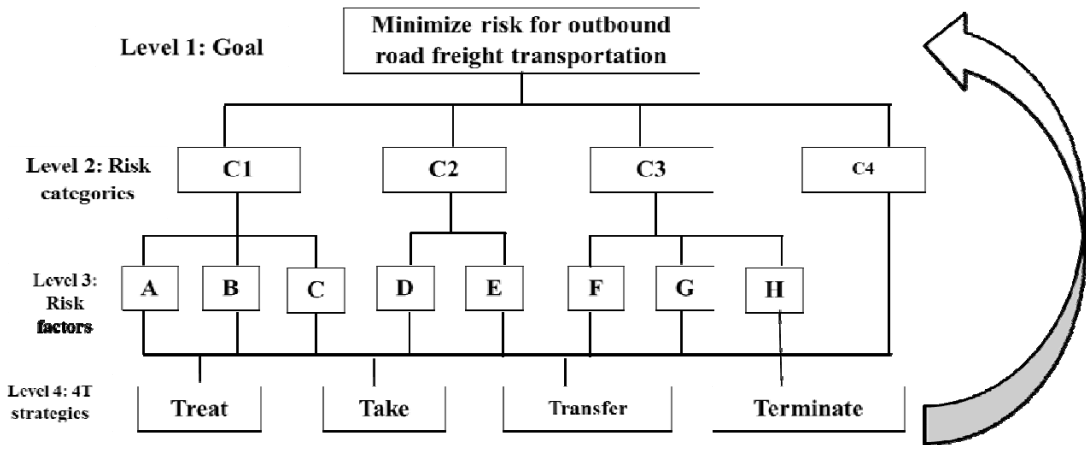


**Figure 3.3** AHP frameworks for risk mitigation

In term of likelihood of occurrence will be measured by 5 numeral scale ranking base on risks management concept.

**3. Risk factors identification**

In this step, risk factors were identified from 2 sources. First is data from secondary source, the problems were contributed from the literatures base on research question *"(1) What are the risk factors from current problems of outbound road freight transportation for LSP associated with current working process and performances of firms??"* Last, the experts will be asked to provide some more risk factors which currently exist in the organization. After the risk factors have been identified, the expert will be asked again to select the important risks base on their expertise. The risk factors, therefore, can be narrowed down by reducing the unnecessary risks. Finally, the validated risks have been obtained.

**4. Data collection**

After research tools and risk factors were identified, raw data will be collected by purposive sampling from experts in management level who have experience in LSPs area. Questionnaires were constructed in 2 risk dimensions namely severity and likelihood of occurrence. For the severity, questionnaire was constructed base on AHP model by weight each criterion by pairwise comparison as shown in as follow:

Which factor is the most important for outbound road freight transportation through a pairwise comparison of each factor by experts.

| **No.** | **Risk Factors** | **9** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **Risk Factors** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A | | | | | | | | | | | | | | | | | | B |
| 2 | A | | | | | | | | | | | | | | | | | | C |
| 3 | B | | | | | | | | | | | | | | | | | | C |

1= Equal, 3 = Moderate, 5= Strong, 7= Very Strong, 9= Extreme

For the likelihood of occurrence, questionnaire was constructed base on 5 numeral scale ranking by 1 is means almost never occur and 5 means almost certain to happen as shown as follow:

| Risk Factors | Probability | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| A | | | | | |
| B | | | | | |
| C | | | | | |

**5. Test risk factors**

In this study, risk factors will be analyzed based on questionnaire. The questionnaire is developed based on the concept of risk management. The concept contains 2 important components namely probability to occurrence and severity. For the severity, each risk factor will be prioritized base on AHP concept. For the likelihood to occurrence use the likert scale from 1 to 5. 1 means improbable and 5 means frequent.

To display the data, in this step determine the levels of risk, severity of each risk agent and likelihood of occurrence (Jenkins et al., 2010). The question is if the risk happened, what the consequence and severity by using numeral scale to assess and prioritize level of risk are. For example, risk equation is:

$$\textit{Risk Priority} = \textit{Severity x Likelihood of Occurrence} \quad (1)$$

After risk factors were prioritized, it is time to mitigate risk factors which locate in action level. Base on the theory of 4Ts of hazard response, Enyinda (2008), risk mitigation process requires the judgment from the experts. The 4Ts is the strategy to manage the significant risk by the common means to mitigate he risk. They stand for:

1) **Treat**: It is the actions which can be performance to control or reduce the probability and severity of risks, so that supply chain disruption can be prevented.

2) **Take**: It refers to the risk acceptance or the risk that cannot be treated or managed.

3) **Transfer**: It refers to the sharing of responsibility to another party if the risks occur. The risks can be shared by using insurance, or outsourcing the operations of the organization to other parties such as supplier, sub-contractors.

4) **Terminate**: The risks can be eliminated by doing things differently, so that opportunities leading to the risk caused by particular activities can be avoided.

**6. Result**

The result will show risk factors, prioritization the risk, and managing the risk which are the answer to research question as mentioned earlier.

**7. Conclusion**

This step is the part of result discussion, recommendation, research limitation as well as suggestion research gap for the future research.

## 3.3 Research Schedule

| **Activities** | **Months** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 1. Formulation research problem | | | | | | | | | | | | |
| 2. Conceptualize for research design | | | | | | | | | | | | |
| 3. Risk factor identification | | | | | | | | | | | | |
| 4. Data collection | | | | | | | | | | | | |
| 5. Test risk factors | | | | | | | | | | | | |
| 6. Result | | | | | | | | | | | | |
| 7. Conclusion | | | | | | | | | | | | |

# CHAPTER IV
# RESULT

This chapter purposes the estimated result of logistics services provider (LSP) focus on outbound road freight transportation with respect to the opening of AEC. The result discussion is divided to 3 major parts which are the answer to research questions as mentioned earlier included:

4.1. Identifying risk factors for logistics services provider (LSP) focusing on outbound road freight transportation with respect to the opening of AEC.

4.2. Prioritizing risk factors based on severity and likelihood of occurrence.

4.3. Suggesting the way to mitigate the priorities risk.

## 4.1. Identifying risk factors for logistics services provider (LSP) focus on outbound road freight transportation with respect to the opening of AEC.

The findings for this step are the answers to research question 1. Based on mentioning in chapter 2, although the goal of AEC is going in the same line with the EU, but there are still many differences between AEC and EU. From SCB(Siam Commercial Bank) Research Analysis EIC(Economic Intelligence Center) (2012), the EU took 35 years to become real free trade area by completely implement of single market, free transportation, and no customs procedures. The current practice of the AEC cross border transportation still does not relax the laws on the cross border customs procedures. Trucks have to stop at border checkpoint in order to pass customs process. Moreover, the trucks have to transit goods in the free zone due to constraints of vehicle standard of each country and also the limited of quota permit of cross border trucks.

In addition, there are approximately 18,399 LSPs in Thailand and the growth rate is about 3.7 percent per year. Visondilok et al. (2012) stated that the LSPs provide transportation services to the customers mainly by truck transportation which is account for 82 percent of total freight transportation. In daily working process of LSP, there are many problems and risks affecting different levels of company performance which is the important criteria for customer consideration.

This study focuses on the truck transportation and the problems occurred by the opening of AEC which affect the local LSPs' performance. In this step, the risk factors were identified from previous literatures and experts interview. As mentioning in chapter 2, the risks were identified into 10 categories and 68 risk factors (see in Appendix B).

After reviewing literature, risk factors were identified in large amount and were selected only the necessary factors which related to outbound road freight transportation base on experts' opinion. The raw data have been collected by purposive sampling from experts in management level who have experience in LSPs area to know the exactly risks and problem that they have encountered as declaring in Table 4.1.

**Table 4.1** Overview of company representative interview

| Experts | Company type | Expert's position | Originality of Company |
|---|---|---|---|
| I | LSP | Executive | Thai |
| II | LSP | Managing Director | Thai |
| III | LSP | Executive | Thai |
| IV | LSP | Executive | Thai |
| V | LSP | Executive | Thai |

According to the risks from literature review in Appendix B, experts were asked to validate and narrow down by reducing the unnecessary risks as shown in the process in Figure 4.1. In this step, experts suggested to combine some risk categories and risk factors together such as capacity risk and delay risk should be included in operation risk, political risk and regulation risk can be combined together as well as

combined the factor of staff work under influence of drug or alcohol, labor dispute, and staff breach a safety rule to be risk from staff performance and responsibility. Then experts also suggested adding some more risk factors in general processes such as strategy in term of truck investment plan. Moreover, experts also emphasize on the changing of government regulation from the opening of AEC, which will attract foreign investors to gain the benefits and market share. Hence, the declination of customers and competitors increasing; therefore, becomes the critical point to concern. Finally, the associated risks are identified and shown in the form of hierarchy in Figure 4.2.

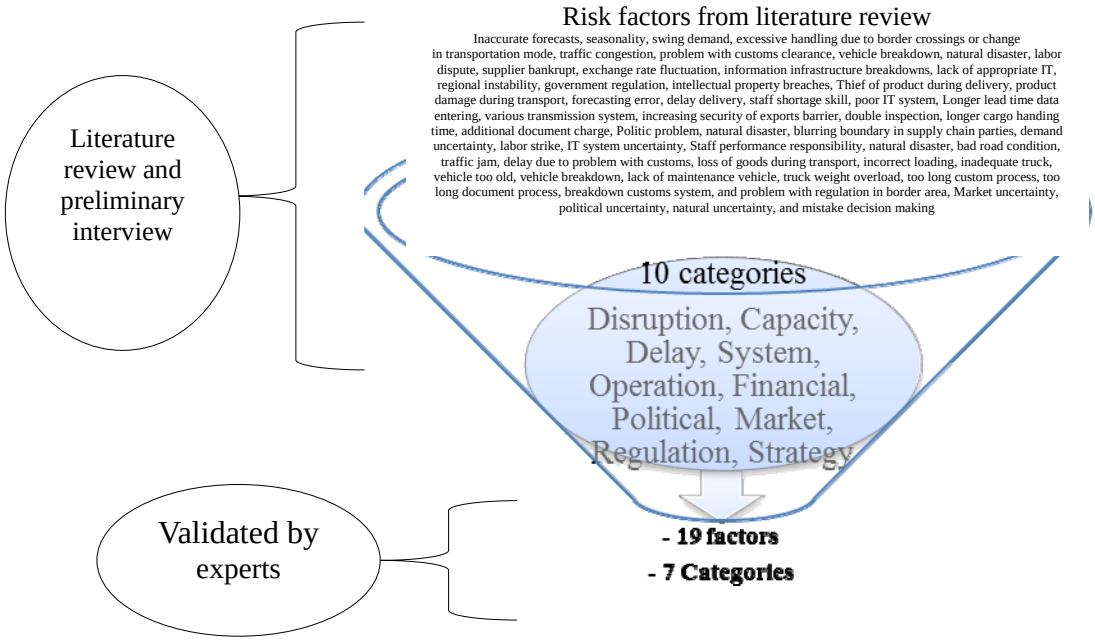


**Figure 4.1** Experts validation process

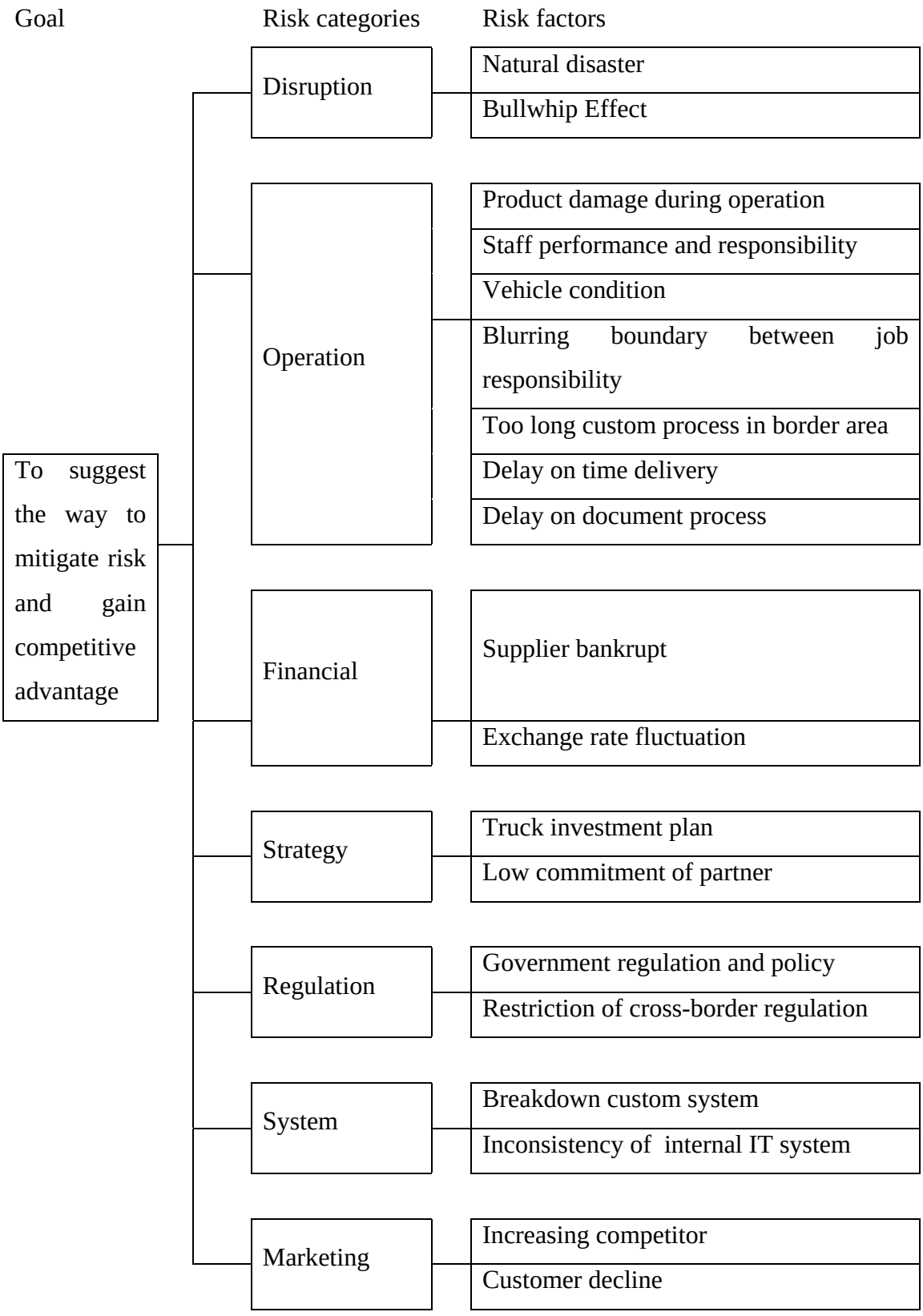


**Figure 4.2** Risk factors identification hierarchy

According to Figure 4.2, the hierarchy form was composed of 3 levels. Level 1 is the major goal of research objective, to suggest the way to mitigate risk and gain competitive advantage. In the level 2, risks can be classified into 7 categories and each category can be decomposed to risk factors in the level 3 as followed:

1. Disruption Risk: The event that is unable to plan may have seriously disrupts to operation of road freight transportation line. In this research, disruption risk can be divided into 2 risk factors include:

- Natural disaster
- Bullwhip affect

2. Operation Risk: Risks from internal processes failures or the error of human, truck, and physical things which may make a loss to firms.

- Product damage during operation
- Staff performance and responsibility
- Vehicle condition
- Blurring boundary between job responsibility
- Too long custom process in border area
- Delay on time delivery
- Delay on document process

3. Financial Risk: The events that may make company loss due to the uncertainty in term of financial.

- Supplier bankrupt
- Exchange rate fluctuation

4. Strategy Risk: Risk from business implementation base on business strategy.

- Truck investment plan
- Low commitment of partner

5. Regulation Risk: Risk from changing of the regulation that affect to business implementation of firm.

- Government regulation and policy
- Restriction of cross border regulation

6. System Risk: Risk from system failure. Information system network is very important for LSP business implementation. Chopra and Sodhi (2004) mention to system risk whether “a failure anywhere can cause failure everywhere”.

- Breakdown custom system
- Inconsistency of internal IT system

7. Marketing Risk: Risk from the event that lead to the declining of market value.

- Increasing competitor
- Customer decline

## 4.2. Prioritizing risk factors based on severity and likelihood of occurrence.

In this step, data collection was divided into 2 parts. The first part is to investigate the severity of each risk. Analytic Hierarchy Process (AHP) was applied to prioritize the severity of each risk factor by weight the important of 7 risk categories in level 2 and 19 risk factors in level 3 with respect to the objective. To get the opinion from the experts in road freight transportation industry, the purposive sampling was implemented by 5 experts in management level in local road freight transportation companies.

In the second part is to find the likelihood of occurrence of each risk factor, the questionnaire was constructed base on Likert Scale by using 5 numeral scale raking by 1 means almost never occur and 5 means almost certain to happen.

### 4.2.1. Risk severity analysis

In this step, five experts were requested to answer the questionnaire by bifurcate several pairwise comparisons in order to prioritize the severity of each risk.

As mentioned in chapter 2, in case that there are more than 3 factors in pairwise comparison, the complexity of decision making will be occurred and the opinion of experts may have some bias or error. Hence, consistency index (CI) should be validated. If value of CR > 0.1, it indicates that the significant value of pairwise comparison is inconsistent, so it needs to be adjusted the significant value again before moving to the next step (Huizingh and Vrolijk, 1994). However, the modifying of the value need to respect the same interested of experts.

According to the result of questionnaire part1 from respondents, the data were used as input to analyze by using Super Decisions Software version 2.4.0-RC1, can be downloaded from the website: http://www.superdecisions.com, based on AHP model.

After fill the input data into the risks prioritization model, the result will be run automatically. Figure 4.3 represents the feature of the analytical tool which divide into 3 parts. For part 1 is on the left side indicate to the selected node or cluster. Part 2 in the middle is node comparisons, the displaying of this part can be both form of bifurcate several pairwise comparisons and form of matrix in Figure 4.4. The last part is on the right hand side is result, this part show the proportion weight of each criteria as well as consistency ratio that must be less than 0.1.

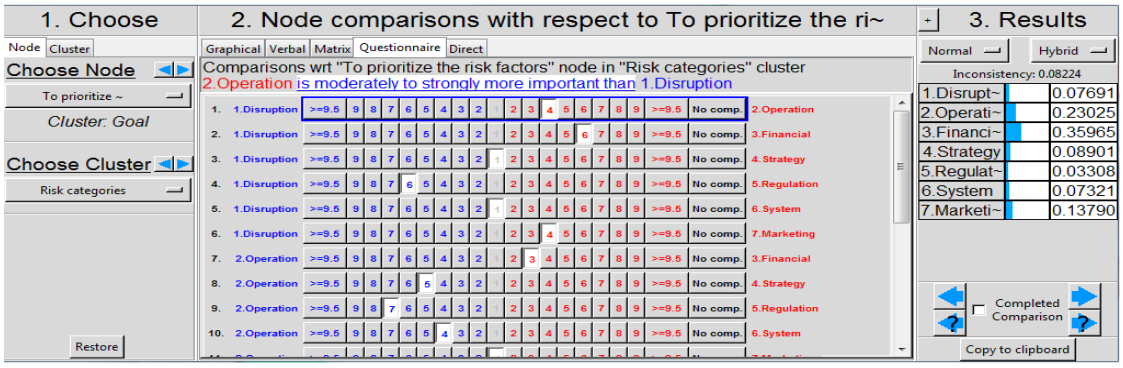


**Figure 4.3** Sample feature of Super Decision Software (pairwise comparison)

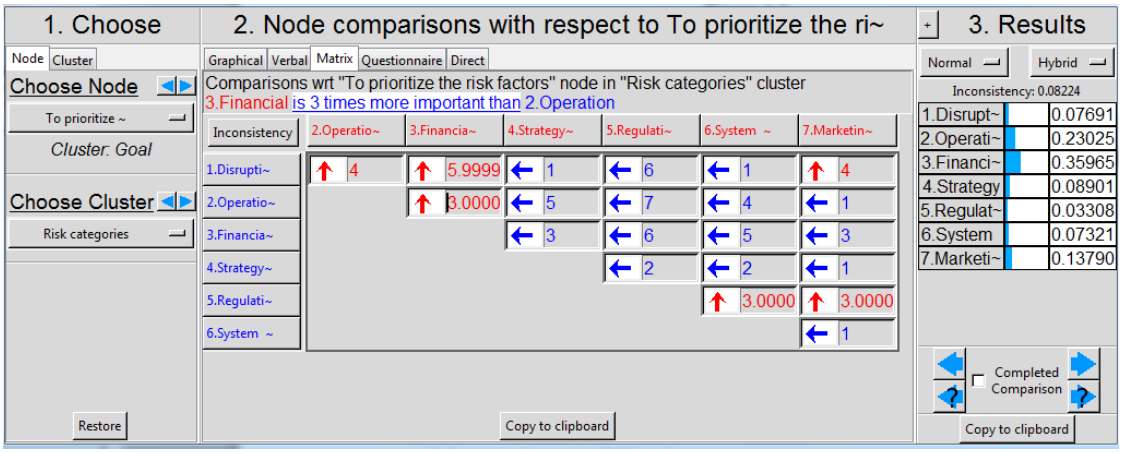


**Figure 4.4** Sample feature of Super Decision Software (matrix)

Table 4.2 show the judgement from experts in term of severity of hierarchy level 2 (risk categories). And for the result in level 3, the analysis of each risk, factor is shown in Table 4.3.

**Table 4.2** Weight of risk categories by experts #1-5

| **Categories** | Experts | | | | | Average |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | |
| Disruption | 0.5699443 | 0.310205 | 0.0601415 | 0.2352038 | 0.0769089 | 0.2505 |
| Operation | 0.2095479 | 0.0458401 | 0.1208192 | 0.4094872 | 0.2302483 | 0.2032 |
| Financial | 0.0254597 | 0.1139166 | 0.2601163 | 0.0429342 | 0.3596474 | 0.1604 |
| Strategy | 0.0671393 | 0.1432739 | 0.021322 | 0.1015186 | 0.0890059 | 0.0845 |
| Regulation | 0.0366396 | 0.0897 | 0.1276215 | 0.0679867 | 0.0330814 | 0.0710 |
| System | 0.0413796 | 0.2525156 | 0.3827714 | 0.084262 | 0.0732125 | 0.1668 |
| Marketing | 0.0498895 | 0.0445488 | 0.0272081 | 0.0586074 | 0.1378956 | 0.0636 |
| **CR < 0.1** | **0.09762** | **0.07758** | **0.09935** | **0.09945** | **0.08224** | |
| **Summation** | **1** | **1** | **1** | **1** | **1** | **1** |

**Table 4.3** Weight of risk factors by experts 1-5 with respect to each category

| Categories | Risk Factors | Experts | | | | | Average |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 2 | 4 | 5 | |
| Disruption | 1. Natural Disaster | 0.8889 | 0.1250 | 0.1250 | 0.1250 | 0.9000 | 0.4328 |
| | 2. Bullwhip effects | 0.1111 | 0.8750 | 0.8750 | 0.8750 | 0.1000 | 0.5672 |
| Operation | 3. Product damage during operation | 0.5355 | 0.2309 | 0.0619 | 0.2309 | 0.2095 | 0.2537 |
| | 4. Staff performance and responsibility | 0.1172 | 0.0890 | 0.3836 | 0.0890 | 0.0809 | 0.1519 |
| | 5. Blurring boundaries between job responsibility | 0.0950 | 0.1314 | 0.3032 | 0.1314 | 0.3448 | 0.2012 |
| | 6. Vehicle condition | 0.0688 | 0.2697 | 0.0602 | 0.2697 | 0.2890 | 0.1915 |
| | 7. Too long customs process in border area | 0.0292 | 0.0305 | 0.1274 | 0.0305 | 0.0266 | 0.0488 |
| | 8. Delay on time delivery | 0.1307 | 0.0647 | 0.0335 | 0.0647 | 0.0246 | 0.0636 |
| | 9. Delay document process | 0.0237 | 0.1838 | 0.0300 | 0.1838 | 0.0246 | 0.0892 |
| | **More than 2 factors CR must be <0.1** | **0.0912** | **0.0947** | **0.09937** | **0.09785** | **0.08805** | |
| Marketing | 10. Supplier bankrupt | 0.9000 | 0.1429 | 0.9000 | 0.1429 | 0.8750 | 0.5922 |
| | 11. Exchange rate fluctuation | 0.1000 | 0.8571 | 0.1000 | 0.8571 | 0.1250 | 0.4078 |
| Strategy | 12. Truck investment plan | 0.1111 | 0.1667 | 0.1111 | 0.1667 | 0.1667 | 0.1445 |
| | 13. Low commitment of partners | 0.8889 | 0.8333 | 0.8889 | 0.8333 | 0.8333 | 0.8555 |
| Regulation | 14. Government regulation | 0.1111 | 0.8333 | 0.1250 | 0.8333 | 0.5000 | 0.4805 |
| | 15. Restriction of cross-border regulation | 0.8889 | 0.1667 | 0.8750 | 0.1667 | 0.5000 | 0.5195 |
| System | 16. Breakdown custom system | 0.8889 | 0.2000 | 0.1111 | 0.2000 | 0.5000 | 0.3800 |
| | 17. Lack of appropriate IT | 0.1111 | 0.8000 | 0.8889 | 0.8000 | 0.5000 | 0.6200 |
| Marketing | 18. Increasing competitor | 0.8750 | 0.8333 | 0.8889 | 0.8333 | 0.5000 | 0.7861 |
| | 19. Customer decline | 0.1250 | 0.1667 | 0.1111 | 0.1667 | 0.5000 | 0.2139 |

According to Table 4.2 and Table 4.3, although the samples of this study are the experts who have experience in road freight transportation industry but each expert still has different interest on risk perspective depending on what they have encountered. Hence, this study conduct arithmetic mean to reduce bias of the

judgement from each expert to find the value mean as shown in average column in above table.

According to Table 4.2 show the priority score of risk categories by summation of result in each risk factor in the same column must be equal to 1. In the results experts give emphasis on “disruption risk” to be the first priority following by “operation risk”, “system risk”, “financial risk”, “strategy risk”, “regulation risk” and “marketing risk” respectively.

From the result in Table 4.3 show that how much a local criteria or risk factor of each category individually prefers another risk factor in the same category by the numbers are displayed in proportion and the summation of result in each risk factor in the same category must be equal to 1. For example, in disruption risk, average of the judgement of bullwhip effect is preferable than natural disaster in proportion (0.4328: 0.5672).

To know how they are prioritized severity for each risk factor, there are 5 columns which are noticed via the result table.

1. Category column: This column notice 7 of risk categories.

2. Weight of category column: The numbers represent to the important weight of 7 risk categories by the summation of number of this column must be equal to 1.

3. Risk factors: This column is noticed 19 risk factors with respect to risk categories in column 1.

4. Weight within category: The numbers are weighted of risk factors within their category by the summation of risk factors in the same category must be equal to 1.

5. Overall risk severity column: The numbers represent to weight of global criteria or proportion of overall risk factors which is calculated by number from column 2 multiply by number from column 4. The summation of numbers in this column must be equal to 1.

To find the final prioritization of risk severity, priority weight of all risk factors will be multiplied by priority weight of their categories. The result will be the proportion of all risk factors or global criteria and the summation of all risk factors from each expert must be equal to 1 as shown in Table 4.4.

**Table 4.4** Overall prioritization of risk severity

| Categories | Risk Factors | Category | Risk factor | Overall priority |
|---|---|---|---|---|
| Disruption | 1. Natural Disaster | 0.2505 | 0.4328 | 0.1084 |
| | 2. Bullwhip effects | | 0.5672 | 0.1421 |
| Operation | 3. Product damage during operation | 0.2032 | 0.2537 | 0.0516 |
| | 4. Staff performance and responsibility | | 0.1519 | 0.0309 |
| | 5. Blurring boundaries between job responsibility | | 0.2012 | 0.0409 |
| | 6. Vehicle condition | | 0.1915 | 0.0389 |
| | 7. Too long customs process in border area | | 0.0488 | 0.0099 |
| | 8. Delay on time delivery | | 0.0636 | 0.0129 |
| | 9. Delay document process | | 0.0892 | 0.0181 |
| Marketing | 10. Supplier bankrupt | 0.1604 | 0.5922 | 0.0950 |
| | 11. Exchange rate fluctuation | | 0.4078 | 0.0654 |
| Strategy | 12. Truck investment plan | 0.0845 | 0.1445 | 0.0122 |
| | 13. Low commitment of partners | | 0.8555 | 0.0723 |
| Regulation | 14. Government regulation | 0.0710 | 0.4805 | 0.0341 |
| | 15. Restriction of cross-border regulation | | 0.5195 | 0.0369 |
| System | 16. Breakdown custom system | 0.1668 | 0.3800 | 0.0634 |
| | 17. Lack of appropriate IT | | 0.6200 | 0.1034 |
| Marketing | 18. Increasing competitor | 0.0636 | 0.7861 | 0.0500 |
| | 19. Customer decline | | 0.2139 | 0.0136 |
| | Summation | 1 | | 1 |

According to Table 4.4, the overall priority column shows the overall prioritization score of 19 risk factors in term of severity. The scores indicate that

"bullwhip effect" or demand uncertainty has the highest proportion for experts consideration following by national disaster. These 2 factors become first 2 priorities because they are unable to control and pretty high severity of consequence. The result from above table can display in form of hierarchy as shown in Figure 4.5.

| Goal | Risk categories | Risk factors |
|---|---|---|
| To suggest the way to mitigate risk and gain competitive advantage | Disruption (0.2505) | Natural disaster (0.4328) 0.1084 |
| | | Bullwhip Effect (0.5672) 0.1421 |
| | Operation (0.2032) | Product damage during operation (0.2537) 0.0516 |
| | | Staff performance and responsibility (0.1519) 0.0309 |
| | | Vehicle condition (0.2012) 0.0409 |
| | | Blurring boundary between job responsibility (0.1915) 0.0409 |
| | | Too long custom process in border area (0.0488) 0.0389 |
| | | Delay on time delivery (0.0636) 0.0129 |
| | | Delay on document process (0.0892) 0.0181 |
| | Financial (0.1604) | Supplier bankrupt (0.5922) 0.0950 |
| | | Exchange rate fluctuation (0.4078) 0.0654 |
| | Strategy (0.0845) | Truck investment plan (0.1445) 0.0122 |
| | | Low commitment of partner (0.8555) 0.0723 |

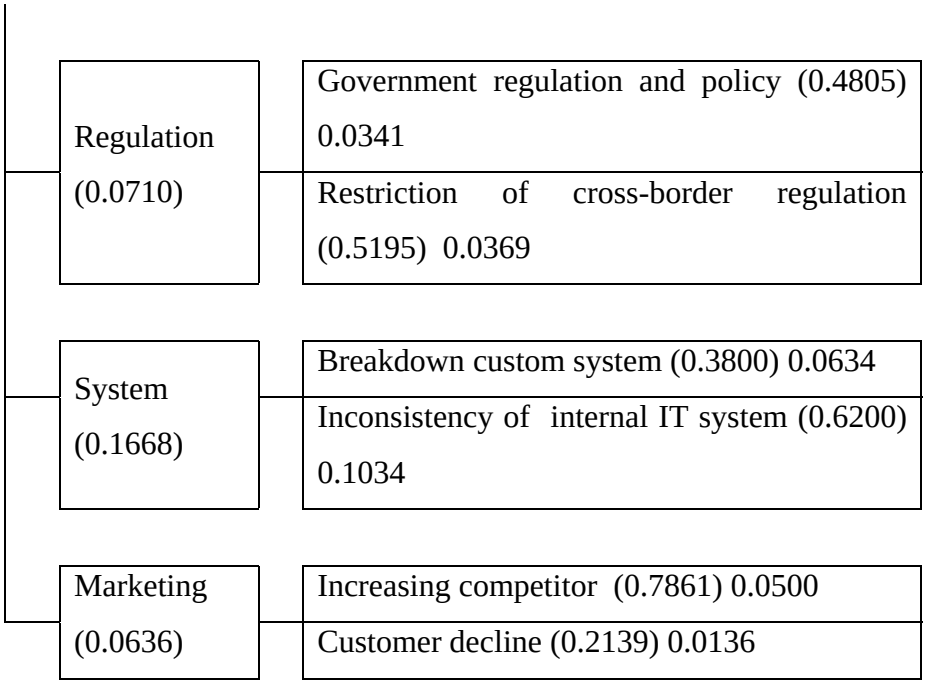


**Figure 4.5** Risks prioritization in hierarchy form

### 4.2.2. Risk likelihood of occurrence analysis

In this part is to investigate the likelihood of occurrence of each risk factor. In daily working process of LSP, there are many risks occur in different levels of frequency. According to the result from questionnaire part 2, the data was collected by simply method call “Likert Scale” which applied 5 numerals scale to rank the opportunity of each risk as shown in Table 4.5.

**Table 4.5** Experts judgement for likelihood of occurrence

| Categories | Risk Factors | Experts | | | | | Average |
|---|---|---|---|---|---|---|---|
| | | R1 | R2 | R3 | R4 | R5 | |
| Disruption | 1. Natural Disaster | 2 | 3 | 1 | 2 | 2 | 2.0 |
| | 2. Bullwhip effects | 4 | 5 | 5 | 4 | 3 | 4.2 |
| Operation | 3. Product damage during operation | 4 | 4 | 3 | 2 | 4 | 3.4 |
| | 4. Staff performance and responsibility | 4 | 4 | 3 | 4 | 4 | 3.8 |
| | 5. Blurring boundaries between job responsibility | 3 | 3 | 2 | 2 | 4 | 2.8 |
| | 6. Vehicle condition | 3 | 5 | 2 | 2 | 4 | 3.2 |
| | 7. Too long customs process in border area | 2 | 3 | 4 | 2 | 5 | 3.2 |
| | 8. Delay on time delivery | 2 | 3 | 3 | 3 | 3 | 2.8 |
| | 9. Delay document process | 2 | 3 | 4 | 2 | 3 | 2.8 |
| Marketing | 10. Supplier bankrupt | 1 | 2 | 5 | 1 | 4 | 2.6 |
| | 11. Exchange rate fluctuation | 2 | 4 | 3 | 2 | 3 | 2.8 |
| Strategy | 12. Truck investment plan | 3 | 2 | 1 | 1 | 2 | 1.8 |
| | 13. Low commitment of partners | 2 | 4 | 4 | 3 | 3 | 3.2 |
| Regulation | 14. Government regulation | 2 | 4 | 3 | 3 | 5 | 3.4 |
| | 15. Restriction of cross-border regulation | 2 | 4 | 3 | 3 | 4 | 3.2 |
| System | 16. Breakdown custom system | 2 | 3 | 1 | 3 | 3 | 2.4 |
| | 17. Lack of appropriate IT | 3 | 4 | 4 | 3 | 3 | 3.4 |
| Marketing | 18. Increasing competitor | 4 | 3 | 4 | 3 | 5 | 3.8 |
| | 19. Customer decline | 5 | 3 | 4 | 3 | 5 | 4.0 |

According to Table 4.5, although each expert has different opinion in some parts but the arithmetic mean indicate that the high frequency risk factors or the likelihood occurrence or greater than or equal to 4 include bullwhip effect and followed by the risks from customer decline, staff performance responsibility, and increasing of competitors.

### 4.2.3. Overall risk factors analysis

This is the step to determine the levels of risk, severity of each risk factor and likelihood of occurrence. The result of both parts will be calculated and prioritized by following risk equation (1):

$$Risk\ Priority = Severity\ x\ Likelihood\ of\ Occurrence \quad (1)$$

To know how they are prioritized for each risk factor, there are 5 columns which are noticed via the result table.

1. Category column: This column notice 7 of risk categories.
2. Risk Factor: This column notice 19 of risk factors
3. Severity: This column represent to the severity of each risk factor in column base in AHP model in Table .
4. Likelihood of occurrence column: This column represent to the likelihood of occurrence for each risk factor in Table.
5. Overall priority: The numbers are proportion weight of all risk factors. The results in this column were calculated by multiplying between risk severity in column 3 and likelihood of occurrence in column 4 as risk equation that was mentioned above.

From above steps, the results of overall risk factors analysis have been calculated as shown in Table 4.6.

**Table 4.6** Overall risk factors analysis

| Categories | Risk factors | Severity | Likelihood of occurrence | Overall priority |
|---|---|---|---|---|
| Disruption | 1. Natural Disaster | 0.1084 | 2.0 | 0.2168 |
| | 2. Bullwhip effects | 0.1421 | 4.2 | 0.5968 |
| Operation | 3. Product damage during operation | 0.0516 | 3.4 | 0.1754 |
| | 4. Staff performance and responsibility | 0.0309 | 3.8 | 0.1174 |
| | 5. Blurring boundaries between job responsibility | 0.0409 | 2.8 | 0.1145 |
| | 6. Vehicle condition | 0.0389 | 3.2 | 0.1245 |
| | 7. Too long customs process in border area | 0.0099 | 3.2 | 0.0317 |
| | 8. Delay on time delivery | 0.0129 | 2.8 | 0.0361 |
| | 9. Delay document process | 0.0181 | 2.8 | 0.0507 |
| Marketing | 10. Supplier bankrupt | 0.0950 | 2.6 | 0.2470 |
| | 11. Exchange rate fluctuation | 0.0654 | 2.8 | 0.1831 |
| Strategy | 12. Truck investment plan | 0.0122 | 1.8 | 0.0220 |
| | 13. Low commitment of partners | 0.0723 | 3.2 | 0.2314 |
| Regulation | 14. Government regulation and policy | 0.0341 | 3.4 | 0.1159 |
| | 15. Restriction of cross-border regulation | 0.0369 | 3.2 | 0.1181 |
| System | 16. Breakdown custom system | 0.0634 | 2.4 | 0.1522 |
| | 17. Lack of appropriate IT | 0.1034 | 3.4 | 0.3516 |
| Marketing | 18. Increasing competitor | 0.0500 | 3.8 | 0.1900 |
| | 19. Customer decline | 0.0136 | 4.0 | 0.0544 |

According to Table 4.6, the results show that risk from “bullwhip effect” is the most critical factor due to high severity and almost certain to happen following by “lack of appropriate IT”, and “supplier bankrupt” which are first 3 priority while the last 3 priority are “delay on time delivery”, “too long customs process in border area”,

and “truck investment plan” respectively. For the chart of result from overall risk factor analysis will show in Figure 4.6.

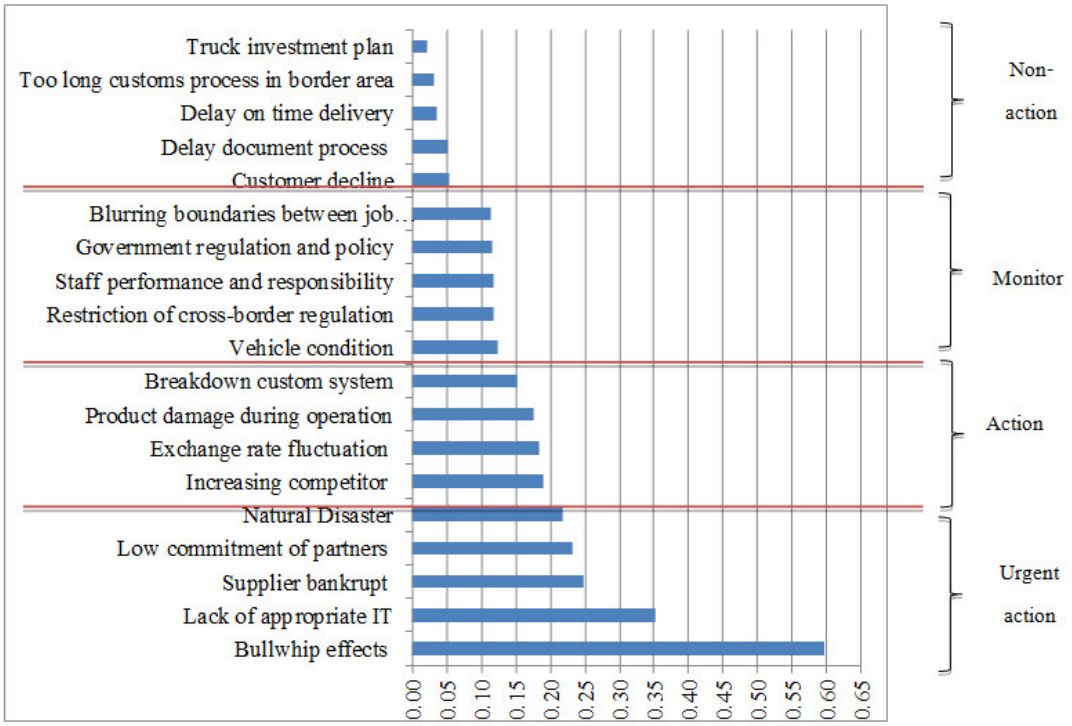


**Figure 4.6** Overall risk factor analysis charts

Figure 4.6 represents the difference between priority levels of each risk factor and can represent clearly for comparison. If considering from vertical line, there is only risk from “bullwhip” effect that locate outstanding higher than the others following by “lack of appropriate IT”, “low commitment of partner”, “sub-contractor bankrupt” and “natural disaster” due to high severity and almost certain to happen. The score of these factors are higher than 2.00 indicate to very high consequence which should take an urgent action to reduce the risks. And the factors that have risk score locate in between 0.15-0.2 including 4 risk factors namely “increasing of competitor”, “product damage during operation”, “exchange rate fluctuation”, and “breakdown customs system”. These factors are medium-high consequence and should take an action to reduce these risks. The other risks which score between 0.1-0.15 locate in low-medium level namely “vehicle condition”, “restriction of cross-border

regulation", "staff performance and responsibility", "government regulation and policy", and "blurring boundaries between job responsibility". Despite they do not need an immediate action but company should monitor the situation and prepare for emergency plan. Last, the risk factors that are lower than 0.1 means the consequence is very low and acceptable.

Next step, 9 risk factors in action level from action level will be selected to find the avenues for mitigation strategies.

## 4.3. Suggesting the way to mitigate the priorities risk.

In this part is to answer research question 3 "how to manage the priorities risks". After 9 priorities risks were selected, the questionnaire was distribute to experts again for asking opinion constructed in form of "open-ended questionnaire" in order to know exactly what the action should be by basing on 4Ts of hazard response (Enyinda, 2008) which is mentioned in Chapter 3.

In this part, fish bone diagram will be used to display the result of the mitigation strategies. Usually fish bone diagram is used to identify and show the relation between problem and possible cause. But the main benefit of fish bone diagram is to display the result from brainstorming (Maneeniem, 2014). In this study, fish bone diagram will conduct to collect the idea from experts for the mitigation strategies of each risk.

**1) Bullwhip effect**

For the risk from bullwhip effect, mostly causes of this risk are from the uncertainty of demand or poor demand forecasting for example insufficient staffs, inadequate truck, rapidly change loading plan as well as consequence from manufacturing delay which may disrupt the operation for logistics companies. Moreover, these factors are unable to control by company. Hence, logistics companies should have a preparation to cope with this risk.

In this study, experts suggest mean to mitigate the risk from bullwhip effect as shown in Figure 4.6.

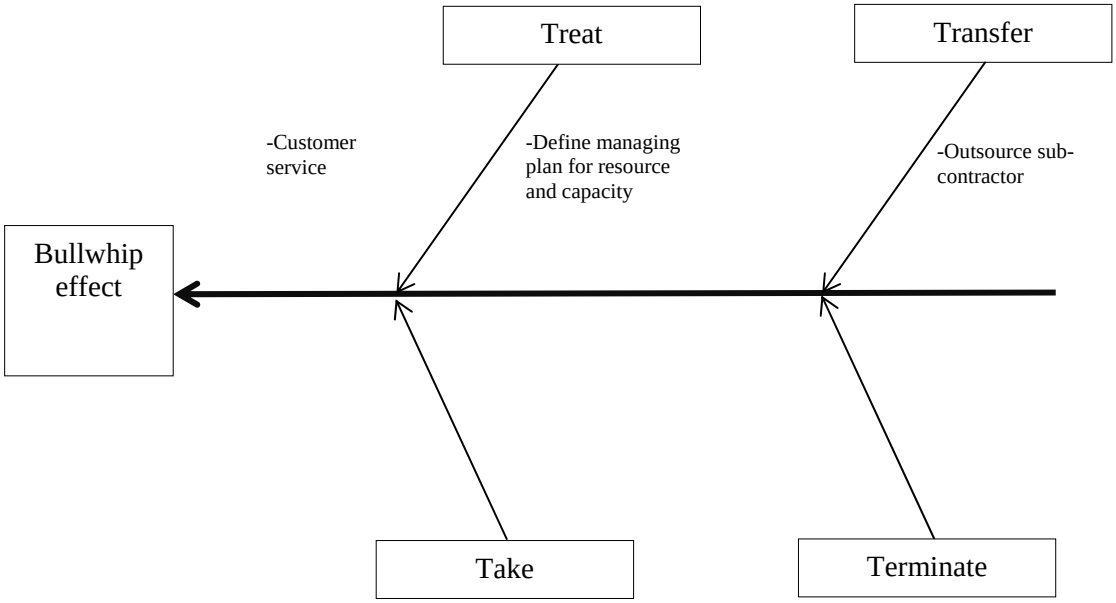


**Figure 4.7** Mitigation strategies for bullwhip effect

According to Figure 4.7, experts propose the ways to cope the bullwhip effect as following:

- Treat: First, company should have managing plan for resource and capacity. The efficiency plan for resource and capacity, and the accuracy of demand forecasting will help company manage any problem by smoothly. Moreover, customer service is required to exchange information with customer as well as answer to customer in case there is any problem.

- Transfer: In case there are insufficient resource and capacity, sub-contractor is one alternative for serving customer. To control the quality of sub-contractor, company has to follow up their operation as well as assess working performance.

**2) Lack of appropriate IT**

In this factor involve the problem from internal information system for example system inconsistency, network system failure, IT system instability, etc. These problems will make the firm unable to run information flow or in worst case

company may lost necessary document or data which are very important for business implementation especially exports transaction system.

In this study, experts suggest mean to mitigate the risk from lack of appropriate IT as shown in Figure 4.8.

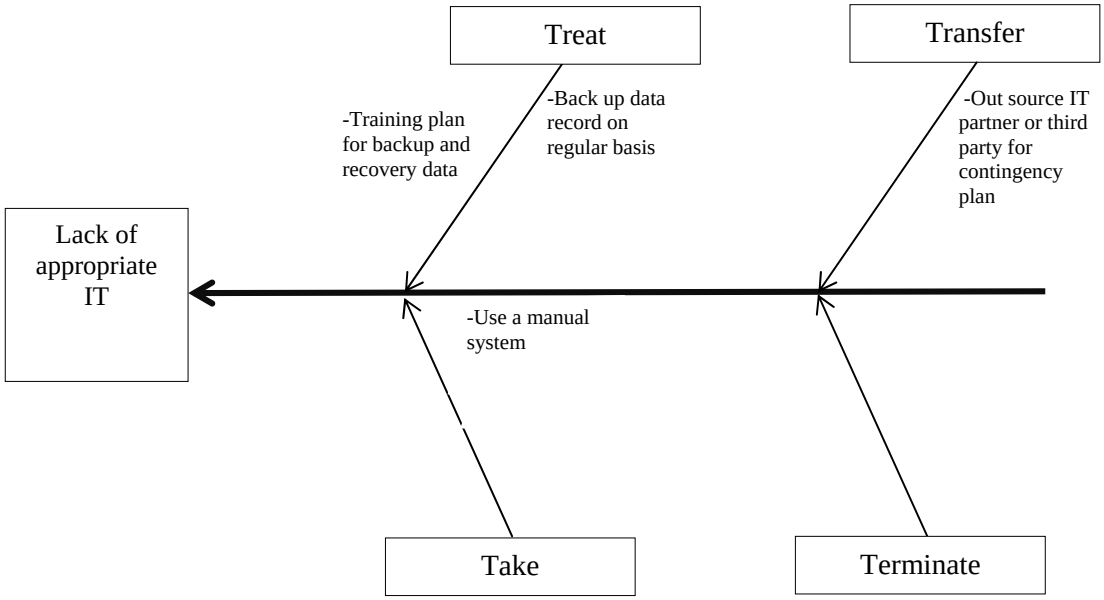


**Figure 4.8** Mitigation strategies for lack of appropriate IT

According to Figure 4.8, the solution for problem from IT system can be implemented by following ways:

- Treat: Company should train people to backup and recovery data and back up data record on regular basis as well as using manual system. Moreover, staffs should be educated to have an awareness to the important of information system and consequence when problem occur because nobody know that when it will occur.
- Take: Set up red flag alert when there is something wrong with the system.
- Transfer: Use third party service or IT partner who have experience and reliability or the contingency plan

**3) Supplier bankrupt**

As mentioning in chapter 2, there are approximately 18,399 LSPs in Thailand and the growth rate is about 3.7 percent per year. Visondilok et al. (2012) stated that the LSPs provide transportation services to the customers mainly by truck transportation which is account for 82 percent of total freight transportation. Most of companies outsource third-party to fulfill shipment serving. From the fierce competition, many small truck companies try to underbid to get the shipment from the customer. Hence, sub-contractors have to carry cost and risk from any fluctuation. Moreover, some supplier need to pay in advance for transaction and billing period is pretty long. Therefore, some of supplier has to face with problem from liquidity.

In this study, experts suggest the way to manage the risk from supplier bankrupt as shown in Figure 4.9

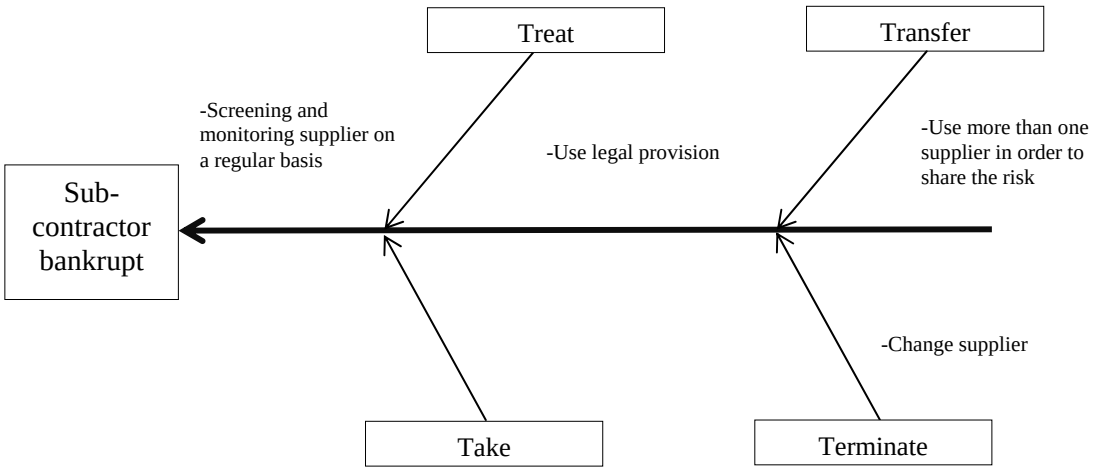


**Figure 4.9** Mitigation strategies for sub-contractor bankrupt

According to Figure 4.9, the ways to prevent this risk were suggested by experts as following:

- Treat: To prevent the likelihood of occurrence of this risk, the firms should screen sub-contractors profile before achieve agreement and monitoring on a regular basis. In the worst case, the legal provision is needed.
- Transfer: To share the risk, the firm should outsource more than one supplier.

- Terminate: To avoid this risk, the firm should change or stop using suppliers who have problem in term of financial.

**4) Low commitment of partner**

In this factor involve the compliance of partner is lower than it should be or low commitment of partner or unable to serve requirement. This risk factor is a big obstacle for business implementation to reach the goal. Hence, company should have means to manage this problem to make business running more smoothly.

In this study, experts suggest mean to mitigate the risk from low commitment of partner as shown in Figure 4.10.

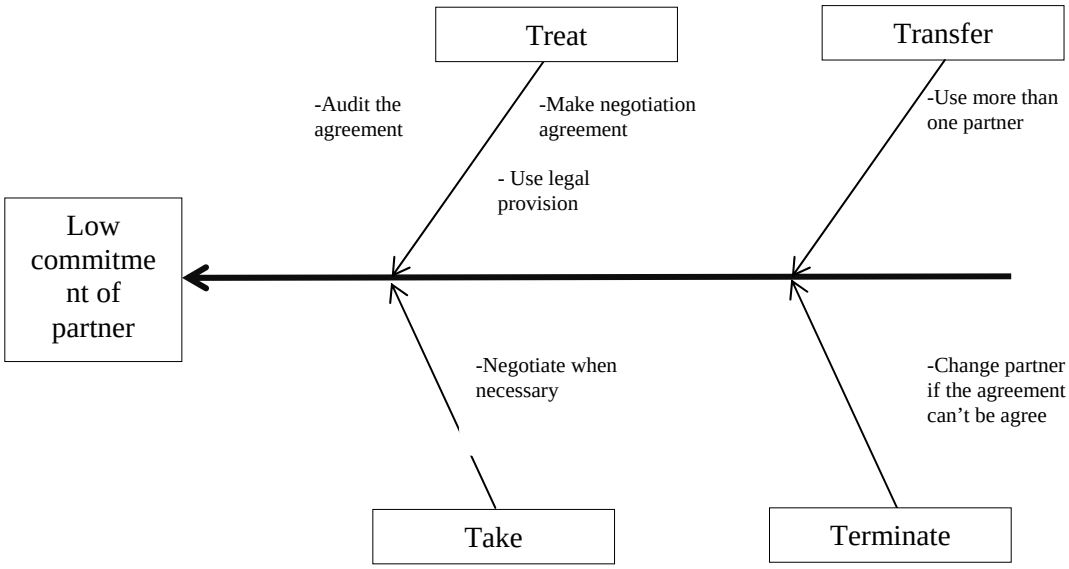


**Figure 4.10** Mitigation strategies for low commitment of partner

According to Figure 4.10, the mitigation of this risk can be mitigated by 4 major strategies as following:

- Treat: First, company should have action to reduce the risk by making negotiation agreement with partner for job responsibility. Then always making audit the agreement and assess working performance to reach working standard. In the worst case, legal provision is needed to handle this problem.

- Take: In the necessary case, company and partner should have negotiation and discussion for occurring problem to find the solution.

- Transfer: Using more than one partner is also one of risk sharing. To have more than one partner is not only reduce impact from the risk, but also enhance bargaining power to partner.

- Terminate: In case that the agreement can't be agreed, changing of partner is needed in order to problem that may occur in the future.

**5) Natural disaster**

For this factor become an important issue in recently after big flooding in Bangkok and many place in Thailand. Hence, many industries got directly impact from this event, transportation routes were cut, transporters were unable to serve raw material, manufacturer had to stop production line as well as cargoes, infrastructure, equipment, vehicle, and office got damage from this flooding which leading to a huge loss. Hence, many entrepreneurs started to emphasis on the emergency plan to cope and prevent natural disaster.

In this study, experts suggest mean to mitigate the risk from natural disaster as shown in Figure 4.11.

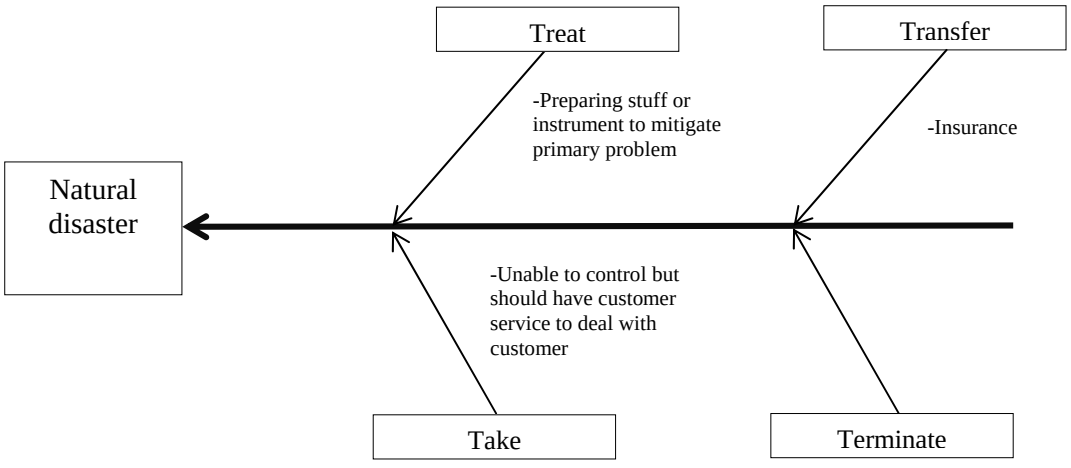


**Figure 4.11** Mitigation strategies for natural disaster

According to Figure 4.11, experts have suggested mitigation strategies to manage the risk from natural disaster as following:

- Treat: In primary case, the operator should prepare some equipment or instrument for primary mitigating; for example, in case that there is raining and disturb loading process, the operator can use burlap to protect the water in order to carry on the operation.
- Take: Due to this risk is unable to control but there should be customer service to explain and answer the question to customer.
- Transfer: Insurance is also one alternative to share the responsibility if some loss happen from natural disaster.

**6) Increasing competitor**

As mentioning in literature review, the opening of AEC has directly impact on logistics industry in Thailand especially demand of cross-border transportation will have significant increase. But the changing of the regulation that allow international logistics company come to hold equity up to 70% that attract many international logistics companies to invest in ASEAN and grab market share especially in Thailand because Thailand is important production base and fully equip with exports factor. Hence, local LSP should be awake and continue improving to survive the competition.

In this study, experts suggest mean to mitigate the risk from increasing competitor as shown in Figure 4.10

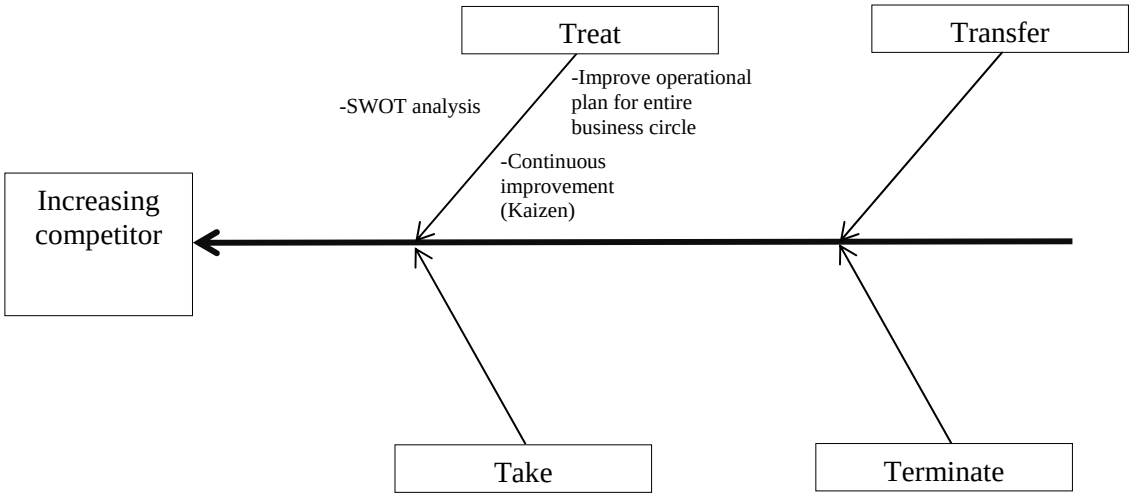


**Figure 4.12** Mitigation strategies for increasing of competitor

According to Figure 4.12, experts have suggested the avenues to manage risk from increasing of competitor as following:

- Treat: To improve business operation, SWOT analysis was proposed by experts in order to analyze or assess status of company to define the strategic plan as well as framework to achieve the target. Then improve the operational plan of entire business circle with respect to SWOT of company, breaking down all activity base on value chain concept and continuous improvement (Kaizen).

**7) Exchange rate fluctuation**

In every business has to be encountered with this risk and very difficult to avoid especially from world economic crisis. Although there was the idea about using of forward exchange rate to prevent this risk, but in practical found that this theory was not accuracy and uncertainty. The fluctuating of currency will has significant influence to LSP industry especially for freight price level. The negative consequence from exchange rate fluctuation may decline the profit or even loss. However, exchange rate fluctuation will affect to LSP only in case of international shipments which have term of payment in foreign currency.

For the case of staff performance and responsibility, experts suggest the way to manage the risk in Figure 4.11.

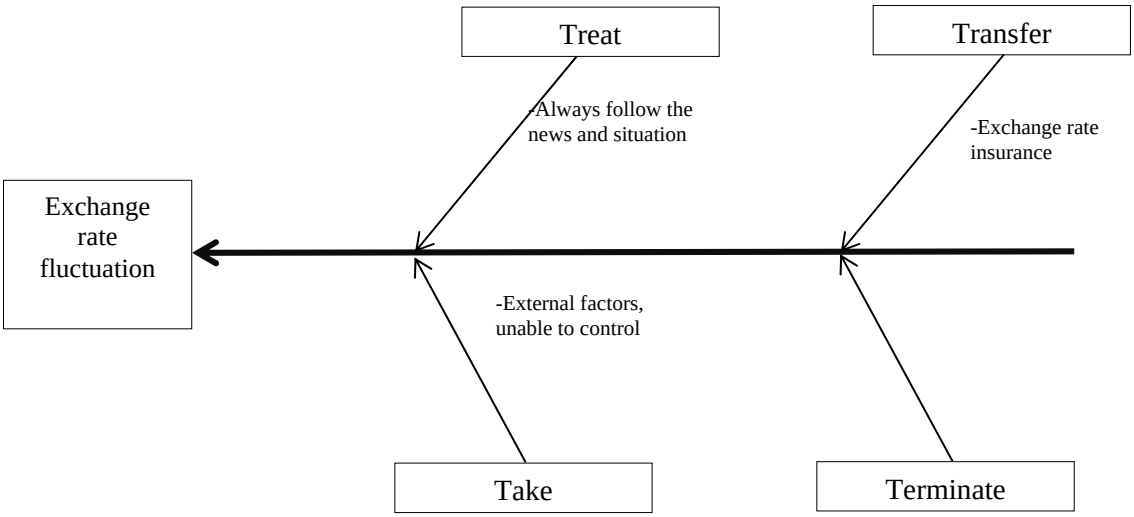


**Figure 4.13** Mitigation strategies for exchange rate fluctuation

According to Figure 4.13, experts suggest measures to mitigate the risk from exchange rate fluctuation as following:

- Treat: To mitigate the negative consequences from exchange rate fluctuation, the firms should be informed and always follow the news and world economic situation in order to define the appropriate and reasonable freight price level. Mostly, the exchange rate fluctuations are cause from following factors (Sumetheeprasit, 2011):

    a) Politic
    b) Revenue and expense rate from export-import
    c) International flow of fund (Inflow-Outflow)
    d) Rate of inflation of each currency
    e) Expectations of consumers as well as confidence level

- Take: Sometime the firms need to take this risk because it is difficult to control.

- Transfer: Due to this factor is difficult to control, experts from banking industry were therefore conducted to share the idea as well as the ways to mitigate this risk. In the view of banking experts, there are 2 offering for mitigating this risks as following:

a) Fx Forward: In this option, the firms can fix the exchange rate at the reserving date. But in case that the rate in the using day is better, the firms still have to use the rate from reserving date.

b) Fx Option: This choice is one of the measures to help the firms to manage financial risk from exchange rate fluctuation by fixing the rate of foreign exchange. In this option different from Fx Forward by the firms can use the better market rate. But there are more condition and more expensive for using this service.

Hence, the firms need to assess the situation as well as trade-of between each alternative whether which one would be worth choice in order to minimize the risk.

**8) Product damage during operation**

For the risk from product damage during operation is physical risk which may decline the reliability of company. Accident can be happened all the time by unexpected, whether it is from human error, vehicle error, and error from equipment as well as environment factor. These can lead to loss in term of product damage which represents to service quality and influence to decision making for supplier selection criteria of customer.

In this study, experts suggest mean to mitigate the risk from increasing competitor as shown in Figure 4.14

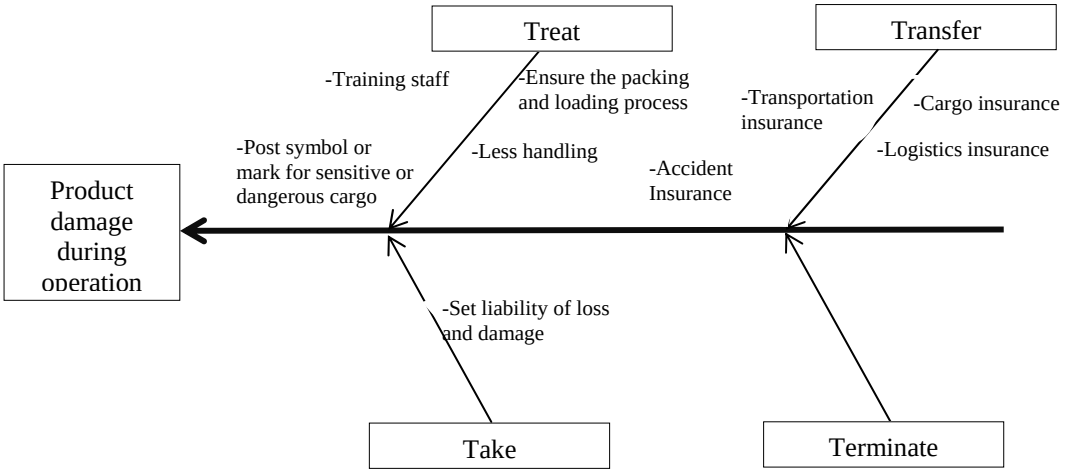


**Figure 4.14** Mitigation strategies for product damage during operation

According to Figure 4.14, experts have suggested mitigation strategies to manage the risk from damage of product during operation as following:

- Treat: To reduce this risk, company should have training course for staffs regularly regarding to safety policy to let them have awareness to the negative consequence of accident during operation. In addition, ensuring working procedure is required for example packing and loading process, and tries to make the least handling and mark the symbol to prevent and control for sensitive or dangerous cargo.
- Take: Set the liability of any loss or damage in case something went wrong.
- Transfer: To share the responsibility, there is the regulation for logistics companies to have insurance for business implementation for example transportation insurance, logistics insurance, cargo insurance, and accident insurance.

**9) Breakdown customs system**

Customs is one of important components for international trading and cross-border transaction. Customs broker and transportation association Thailand (CTAT) revealed that failure of customs system used to be occurred in August 2013, that event was a big crisis for every mode of export-import shipment namely water, air, and road. This event, customs had to work by manual system which was unable to support all shipment in a big quantity because of insufficient staff. Moreover, manual system was very complicate and various transmission process. The consequence if this crisis, many logistics provider were unable to submit container on due date or closing time which make containers were unable to load, transporters were unable to run the operation, manufacturing had to stop production line because lack of raw material, increasing expense for example working overtime, warehousing fee as well as fee of demurrage and etc. Hence, this factor therefore one of critical issue that should be concerned in order to mitigate the negative consequence if the trouble is occurred.

For the risk from breakdown customs system, experts suggest the way to manage the risk in Figure 4.15.

- External factors, unable to control

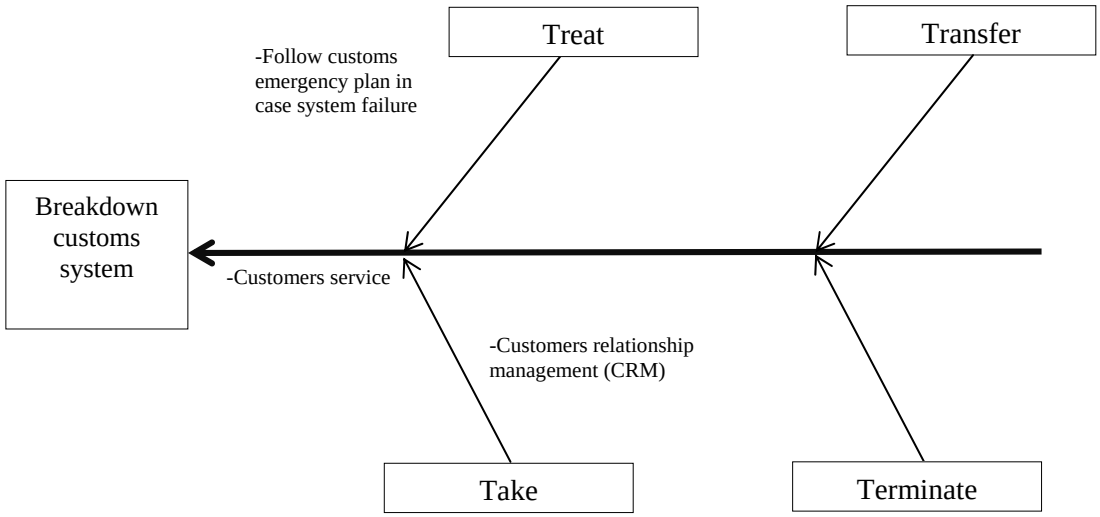


**Figure 4.15** Mitigation strategies for breaking down customs system

According to Figure 4.15, experts suggest means to mitigate the risk from breakdown customs system as following:

- Treat: After big trouble from customs system failure, customs department had invited logistics service provider to make understanding, explain about the cause of problem as well as brainstorming for arranging the guideline to prevent and procedure for the emergency plan. In case that IT, network, and electronics of customs system have trouble which make logistics operators are unable to run the customs process. The logistics operators should follow these procedure:

a) In case there are any problem occur with customs network, customs department will inform the news to involving party by e-mail and telephone as well as announce on internet within 1 hour with the cause of problem, and estimate implementation time and report the progress every 30 minutes.

b) For the customs procedure, the department has prepared the emergency plan with manual system to support temporary transaction process.

c) For the transaction fee of customs process, customs will exempt the fee for data entry of the export-import declaration document.

- Take: Although customs department has prepared an emergency plan but the logistics operators still have to take this risk due to these are external factor and unable to control. Thus, customer service is very important to make understanding

with customer to the cause of problem and the way to mitigate and create the strong customer relationship management.

Although AEC has been opened since the end of 2015 but in term of free flow in the real practice still not relax on the changing of the regulation. But in term of investment, many multinational logistics company gradually come to invest and gain market share in the region. Hence, local logistics service providers have to face a fierce competition and need to improve their ability to maintain the position in the market. This study focuses on the truck transportation and the problems occurred by the opening of AEC which affect the local LSPs' performance. This chapter, risk factors have been identified from literature review and preliminary interview. Then, the combination of AHP concept and risk management theory were used to prioritize the important of each risk by five experts were requested to answer the questionnaire in Appendix B. To find the avenues for mitigating risk, five experts were asked again with open-ended questionnaire in order to gain more precise quality of the answer based on 4Ts strategies. From above information, 3 of research questions have been answered.

# CHAPTER V
# CONCLUSION

This chapter presents a conclusion and recommendation for the further research based on the result in Chapter 4. The discussion of this part is divided into 3 major topics include:

5.1. Result discussion

5.2. Guideline for local LSPs risk management

5.3. Research limitation

5.4. Gap for future research

## 5.1. Result discussion

This study has revealed the risks for local LSPs in Thailand when the stronger Multinational LSPs have entered the ASEAN market and compete with the LSPs. The levels of risks have been determined and prioritized by Analytical Hierarchy Process (AHP) concept in order to help local LSPs to survive and the strategies to manage the risks have been proposed.

This research is divided finding into 3 major parts.

1. Risk identification: Risk factors were identified from reviewed literature and preliminary interview. Then all risks risk factors were validated and selected the important factor by 3 of experts. From the selected risks, risk factors can be categorized into 7 categories: disruption, operations, financial, strategy, regulation, system, and marketing, and 19 sub-categories or risk factors:

1) Natural Disaster (disruption)
2) Bullwhip effects (disruption)
3) Product damage during operation (operation)
4) Staff performance and responsibility (operation)

5) Blurring boundaries between job responsibility (operation)

6) Vehicle condition(operation)

7) Too long customs process in border area (operation)

8) Delay on time delivery (operation)

9) Delay document process (operation)

10) Supplier bankrupt (financial)

11) Exchange rate fluctuation (financial)

12) Truck investment plan (strategy)

13) Low commitment of partners (strategy)

14) Government regulation (regulation)

15) Restriction of cross-border regulation (regulation)

16) Breakdown custom system (system)

17) Lack of appropriate IT (system)

18) Increasing competitor (marketing)

19) Customer decline (marketing)

2. Risk prioritization: This part, risk factors were ranked by 2 dimension, severity and likelihood of occurrence, to gain more precise quality of prioritization. Then all risk factors can be ranked as following:

**Table 5.1** Conclusion of risk prioritization

| Ranking | Risk Factors | Rate |
|---|---|---|
| 1 | Bullwhip effects | 0.5967 |
| 2 | Lack of appropriate IT | 0.3517 |
| 3 | Supplier bankrupt | 0.2470 |
| 4 | Low commitment of partners | 0.2312 |
| 5 | Natural Disaster | 0.2168 |
| 6 | Increasing competitor | 0.1901 |
| 7 | Exchange rate fluctuation | 0.1832 |
| 8 | Product damage during operation | 0.1753 |

**Table 5.1** Conclusion of risk prioritization (cont.)

| Ranking | Risk Factors | Rate |
|---|---|---|
| 9 | Breakdown custom system | 0.1521 |
| 10 | Vehicle condition | 0.1245 |
| 11 | Restriction of cross-border regulation | 0.1180 |
| 12 | Staff performance and responsibility | 0.1173 |
| 13 | Government regulation and policy | 0.1160 |
| 14 | Blurring boundaries between job responsibility | 0.1144 |
| 15 | Customer decline | 0.0544 |
| 16 | Delay document process | 0.0507 |
| 17 | Delay on time delivery | 0.0362 |
| 18 | Too long customs process in border area | 0.0318 |
| 19 | Truck investment plan | 0.0220 |

3. Risk mitigation strategies: The first 9 priorities of above risk factors were selected to suggest for the mitigation strategies base on 4 major measures namely treat, take, transfer, and terminate by the detail of these risks have been purposed in chapter 4.

## 5.2. Guideline for local LSPs risk management

In daily working process of LSPs, there are many risks affecting different levels of company performance which is the important criteria for customer consideration. More of local LSPs still do not have formal plans to cope with the risks, especially for the small size local LSPs. Hence, this research would be useful for local LSPs to turn their attention and give an emphasis on risk management as well as principle measures to handle each risk.

From Table 5.1, experts in management level concern the risks which are hard to control and have directly affects to the performance of company as well as severe affect to long term business strategy. To cope the risks from unexpected events, local LSPs should implement as following:

1) Define flexible managing plan for resource and capacity as well as ensure the accuracy of demand forecasting.

2) Always training staff to have awareness on the important of safety policy as well as primary mitigating procedure in case there is some adverse event occurring for all activities.

3) Create a strong relationship with involving parties and often assess their performance.

4) Use more than one partner or supplier in order to reduce impact from the unexpected risks and enhance bargaining power.

5) Outsource non-core activities to third-party companies who can also support in case of the contingency plan.

6) Continuingly improve business operations, define the clear strategic plan as well as framework to achieve the target.

7) Set liability for any possible loss and have insurance coverage for major possible risks.

Although the strategies for hazard response have been proposed but firms need to assess the situation as well as trade-off between each alternative whether it is the most appropriate in that situation.

## 5.3. Research limitation

This study was implemented with local logistics service provider in Thailand. The study focused only on the overview of outbound road freight transportation without specific to the procedure of each country. The data collection was conducted with experts in managing level to know the exactly risks and problem that they have encountered but unable to all LSPs. In case other research studied different level of management, the result may be different. Replication using experts from other countries or multinational logistics providers, the studies may show the different result.

## 5.4. Recommendation for the further research

The scope of this study covers the risks related to the Outbound Road Freight Transportation Service. The method of this study is the combination between AHP and Risk Management Concept which is another option for risk priority analysis. For the future research, comparison between this method and another method are recommended. Extensively, the detail of relationship between each risk in the study for the future are recommended in order to gain more precise quality of the risks, the impacts, and the ways to effectively mitigate the risks. Moreover, the prioritization for mitigation strategies of each risk as well as the impact of mitigation strategies on each risk is also suggested for the future study.

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# APPENDICES

# APPENDIX A
# STATISTICS OF VALUE TRADE OF THAILAND

In Table A.1 and A.2 represent the numbers of value, growth rate, and proportion of Thailand's export sectors from 2012 to 2015 (January). The statistics indicates that ASEAN countries have the biggest values and proportion compared to the others (see the table) and it is likely to increase continuingly corresponding with the opening of AEC at the end of 2015. Moreover, Table A.3 and A.4 show the structure of important goods exportation. The biggest proportion is principle manufacturing product due to Thailand is a big production base of foreign investor and it also has more advantage on location and infrastructure than neighbor countries. There are connected points with the four countries (Myanmar, Laos, Cambodia, and Malaysia).

Table A.1 Value of exports of goods to ASEAN, Japan, USA, EU (27)

| **Country** | **Value: Million Baht** | | | | |
|---|---|---|---|---|---|
| | **2012** | **2013** | **2014** | **2014 (Jan.)** | **2015 (Jan.)** |
| Total | 7,082,491.0 | 6,909,741.2 | 7,314,700.3 | 576,732.6 | 563,217.8 |
| ASEAN(9) | 1,744,998.1 | 1,792,533.7 | 1,909,592.4 | 145,394.7 | 146,040.2 |
| Japan | 725,044.0 | 671,804.5 | 701,534.6 | 58,285.2 | 54,548.8 |
| USA | 703,918.4 | 694,326.2 | 767,856.3 | 58,712.0 | 62,927.0 |
| EU(27) | 673,979.4 | 677,516.9 | 750,293.3 | 61,636.7 | 58,819.4 |

Source: Information and communication technology center with cooperation of customs department

Table A.2 Growth rate and proportion of exports to ASEAN, JAPAN, USA, EU (27)

| Country | Growth Rate (%) | | | | | Proportion (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2012 | 2013 | 2014 | 2014 (Jan.) | 2015 (Jan.) | 2012 | 2013 | 2014 | 2014 (Jan.) | 2015 (Jan.) |
| Total | 5.58 | -2.44 | 5.86 | 3.93 | -2.34 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| ASEAN | 7.13 | 2.72 | 6.53 | 0.96 | 0.44 | 24.64 | 25.94 | 26.11 | 25.21 | 25.93 |
| Japan | 0.79 | -7.34 | 4.43 | 5.81 | -6.41 | 10.24 | 9.72 | 9.59 | 10.11 | 9.69 |
| USA | 7.21 | -1.36 | 10.59 | 6.66 | 7.18 | 9.94 | 10.05 | 10.50 | 10.18 | 11.17 |
| EU(27) | -7.41 | 0.52 | 10.74 | 10.97 | -4.57 | 9.52 | 9.81 | 10.26 | 10.69 | 10.44 |

Source: Information and communication technology center with cooperation of customs department

Table.A.3 Value of trade between ASEAN separated by group of products

| Description | Value: Million Baht | | | | |
|---|---|---|---|---|---|
| | 2012 | 2013 | 2014 | 2014 (Jan.) | 2015 (Jan.) |
| Total | 1,744,998.1 | 1,792,533.7 | 1,909,592.4 | 145,394.7 | 146,040.2 |
| Agricultural Products | 105,921.3 | 94,586.0 | 109,814.8 | 8,917.7 | 9,997.6 |
| Agro-Industrial Product | 161,812.4 | 153,014.4 | 162,335.4 | 12,808.9 | 12,487.8 |
| Principle Manufacturing Product | 1,171,684.9 | 1,250,260.6 | 1,352,121.6 | 103,310.7 | 105,842.9 |
| Minor and Fuel Product | 305,579.5 | 294,672.8 | 285,320.7 | 20,357.4 | 17,711.9 |

Source: Information and communication technology center with cooperation of customs department

Table A.4 Growth rate and proportion of trade between ASEAN by separate group of products

| Description | Growth Rate (%) | | | | | Proportion (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2012 | 2013 | 2014 | 2014 (Jan.) | 2015 (Jan.) | 2012 | 2013 | 2014 | 2014 (Jan.) | 2015 (Jan.) |
| Total | 7.13 | 2.72 | 6.53 | 0.96 | 0.44 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Agricultural Products | -18.03 | -10.70 | 16.10 | 6.75 | 12.11 | 6.07 | 5.28 | 5.75 | 6.13 | 6.85 |
| Agro-Industrial Products | 12.21 | -5.44 | 6.09 | 4.55 | -2.51 | 9.27 | 8.54 | 8.50 | 8.81 | 8.55 |
| Principle Manufacturing Product | 7.43 | 6.71 | 8.15 | 2.39 | 2.45 | 67.15 | 69.75 | 70.81 | 71.06 | 72.48 |
| Minor and Fuel Product | 15.41 | -3.57 | -3.17 | -9.57 | -13.00 | 17.51 | 16.44 | 14.94 | 14.00 | 12.13 |

Source: Information and communication technology center with cooperation of customs department

Table A.5 Border-trade value of Thailand

| Country | Border Trade Value(Million Baht) | | | Growth Rate % | | Average % |
|---|---|---|---|---|---|---|
| | 2006 | 2011 | 2012 | 2012/2006 | 2012/2011 | 2006-2012 |
| Myanmar | 97,450.79 | 164,375.26 | 180,471.53 | 85.19 | 9.79 | 14.51 |
| Laos | 49,395.54 | 101,660.78 | 132,016.37 | 167.26 | 29.86 | 23.18 |
| Cambodia | 34,929.86 | 63,977.38 | 82,089.07 | 135.01 | 28.31 | 20.02 |
| Malaysia | 370,022.21 | 560,655.40 | 515,923.48 | 39.43 | -7.98 | 8.05 |
| Total | 551,798.40 | 890,668.82 | 910,500.45 | 65.01 | 2.23 | 11.45 |

Source: Department of foreign trade, Ministry of Commerce

According to Table A.5, the border trade value continues growing positively due to the liberalization on transportation after the opening AEC. This will stimulate exports via cross border transportation and enhance numbers of tourists and

cargo truck in border zone especially countries in GMS group. As showed in Table A.6, GMS countries have high proportion in world trading and continue growing although there are a few decline values in exports sector because of economic problem that negatively affects the price of agricultural products and agro-industrial products. As a matter of fact, Malaysia has a biggest proportion of border trade with Thailand (more than 50%) but the growth rate is going negatively due to the crisis in rubber price. However, in overall, it seems going passively. These effects are due to the elimination of tariffs and non-tariff barrier according ASEAN Agreement which makes volume demand of trade in the region are increasing. Nevertheless, the elimination of tariffs has continuously reduced since year 1993. Each country, therefore, gradually reduces their tariffs barrier to 0% on the target in 2015.

Table A.6 Market share between Thailand and GMS Countries

| **Description** | **Share (%)** | | | | |
|---|---|---|---|---|---|
| | **2012** | **2013** | **2014** | **2014 (Jan.)** | **2015 (Jan.)** |
| Total Trade | 18.59 | 19.43 | 20.67 | 20.99 | 22.85 |
| Export | 19.12 | 20.25 | 20.11 | 21.12 | 20.01 |
| Import | 18.11 | 18.70 | 21.21 | 20.88 | 25.58 |
| Trade Balance | 8.33 | 4.37 | 104.89 | 19.39 | 170.67 |

Source: Information and communication technology center with cooperation of customs department

In addition, Table A.7 and A.8 show trade value and growth rate of GMS countries separately from 2012 to 2015 (Jan.)

Table A.7 Trade summary between Thailand and GMS (Only Border Connection)

| Description | Value : million baht | | | | |
|---|---|---|---|---|---|
| | 2012 | 2013 | 2014 | 2014 (Jan.) | 2015 (Jan.) |
| **Thailand - WORLD** | | | | | |
| Total Trade | 14,895,551.50 | 14,567,086.76 | 14,725,203.97 | 1,243,740.09 | 1,148,047.48 |
| Export | 7,082,490.96 | 6,909,741.17 | 7,314,700.31 | 576,732.62 | 563,217.84 |
| Import | 7,813,060.54 | 7,657,345.59 | 7,410,503.65 | 667,007.47 | 584,829.64 |
| Balance | -730,569.58 | -747,604.42 | -95,803.34 | -90,274.84 | -21,611.80 |
| **Thailand - GMS-EC** | | | | | |
| Total Trade | 2,769,339.95 | 2,830,516.68 | 3,043,122.80 | 261,073.17 | 262,331.04 |
| Export | 1,354,228.87 | 1,398,924.53 | 1,471,317.09 | 121,782.78 | 112,723.30 |
| Import | 1,415,111.08 | 1,431,592.15 | 1,571,805.71 | 139,290.40 | 149,607.74 |
| Balance | -60,882.21 | -32,667.62 | -100,488.62 | -17,507.62 | -36,884.45 |
| **Thailand - CAMBODIA** | | | | | |
| Total Trade | 124,580.26 | 139,563.37 | 164,667.53 | 14,988.49 | 15,085.32 |
| Export | 116,780.03 | 128,643.32 | 145,486.68 | 13,489.26 | 11,805.61 |
| Import | 7,800.23 | 10,920.05 | 19,180.85 | 1,499.24 | 3,279.71 |
| Balance | 108,979.80 | 117,723.27 | 126,305.83 | 11,990.02 | 8,525.90 |
| **Thailand - LAOS** | | | | | |
| Total Trade | 149,484.71 | 155,235.44 | 175,508.27 | 14,619.25 | 14,686.85 |
| Export | 110,802.47 | 113,542.08 | 129,666.32 | 11,151.00 | 10,990.72 |
| Import | 38,682.24 | 41,693.35 | 45,841.95 | 3,468.25 | 3,696.14 |
| Balance | 72,120.22 | 71,848.73 | 83,824.37 | 7,682.76 | 7,294.58 |
| **Thailand - MYANMAR** | | | | | |
| Total Trade | 211,343.66 | 238,211.61 | 263,546.23 | 21,248.93 | 23,349.39 |
| Export | 96,523.51 | 114,520.67 | 136,270.14 | 11,167.32 | 11,621.61 |
| Import | 114,820.15 | 123,690.94 | 127,276.08 | 10,081.61 | 11,727.78 |
| Balance | -18,296.64 | -9,170.27 | 8,994.06 | 1,085.71 | -106.16 |

Source: Information and communication technology center with cooperation of customs department

Table A.8 Growth rate of trade between Thailand and GMS (Border Connection Only)

| description | Growth rate (%) 2012 | 2013 | 2014 | 2014 (Jan.) | 2015 (Jan.) |
|---|---|---|---|---|---|
| **Thailand - WORLD** | | | | | |
| Total Trade | 8.8 | -2.21 | 1.09 | -4.21 | -7.69 |
| Export | 5.58 | -2.44 | 5.86 | 3.93 | -2.34 |
| Import | 11.89 | -1.99 | -3.22 | -10.29 | -12.32 |
| Balance | -165.91 | -2.33 | 87.19 | 52.13 | 76.06 |
| **Thailand - GMS-EC** | | | | | |
| Total Trade | 15.69 | 2.21 | 7.51 | 8.66 | 0.48 |
| Export | 7.94 | 3.3 | 5.17 | 9.17 | -7.44 |
| Import | 24.22 | 1.16 | 9.79 | 8.22 | 7.41 |
| Balance | -152.76 | 46.34 | -207.61 | -2.05 | -110.68 |
| **Thailand - CAMBODIA** | | | | | |
| Total Trade | 43.84 | 12.03 | 17.99 | 23.16 | 0.65 |
| Export | 43.75 | 10.16 | 13.09 | 22.85 | -12.48 |
| Import | 45.18 | 40 | 75.65 | 26 | 118.76 |
| Balance | 43.65 | 8.02 | 7.29 | 22.47 | -28.89 |
| **Thailand - LAOS** | | | | | |
| Total Trade | 26.66 | 3.85 | 13.06 | 12.8 | 0.46 |
| Export | 32.64 | 2.47 | 14.2 | 9.56 | -1.44 |
| Import | 12.16 | 7.78 | 9.95 | 24.63 | 6.57 |
| Balance | 47.05 | -0.38 | 16.67 | 3.89 | -5.05 |
| **Thailand - MYANMAR** | | | | | |
| Total Trade | 9.85 | 12.71 | 10.64 | 5.97 | 9.89 |
| Export | 12.39 | 18.65 | 18.99 | 24.59 | 4.07 |
| Import | 7.8 | 7.73 | 2.9 | -9.07 | 16.33 |
| Balance | 11.32 | 49.88 | 198.08 | 151.11 | -109.78 |

Source: Information and communication technology center with cooperation of customs department

# APPENDIX B
# QUESTIONNAIRE

In this part is purpose to show feature of questionnaire for collecting data. This study divided questionnaire into 2 stages base on following research objective:

I. Risk selection
II. Prioritizing risk factors based on severity and probability of occurrence.
III. Suggesting the way to mitigate the priorities risk.

1. Disruption risk.

| Type | Description | Risk Driver | Yes | No |
|---|---|---|---|---|
| Disruption | The event that may have seriously disrupt to operation of road freight transportation line | Natural disaster | | |
| | | Labor strike | | |
| | | Labor dispute | | |
| | | Supplier breach contract agreement | | |
| | | Staff breach a safety rule | | |
| | | Seasonality factor | | |
| | | Bullwhip affect or demand uncertainty | | |
| | | Lack of supplier, staff | | |
| | | Supplier and staff shortage skill | | |
| | | Increase security barrier | | |
| | | Traffic jam | | |
| | | Bad road condition | | |
| | | Weather condition | | |

2. Operation risk

| Type | Description | Risk Driver | Yes | No |
|---|---|---|---|---|
| Operation | The mistake of operation process which may have a loss to firms | Damage product during handling activity | | |
| | | Damage product during transportation | | |
| | | Damage product during storage | | |
| | | Inaccurate document | | |
| | | Accident during delivery | | |
| | | Using wrong handling facility | | |
| | | Driver steal oil | | |
| | | Transport in in-corrected route | | |
| | | Driver use of phones, laptops or TV/inattention | | |
| | | Vehicle breakdown | | |
| | | Cargo was stolen during transit | | |
| | | Blurring boundaries between buying and supplying companies in the chain | | |
| | | Inadequate driver rest period | | |
| | | Vehicle too old | | |
| | | Driver under influence drug or alcohol | | |
| | | Inadequate truck | | |
| | | Dangerous good security | | |
| | | Incorrect loading cargo | | |

3. Financial risk

| Type | Description | Risk Driver | Yes | No |
|---|---|---|---|---|
| Financial | The event that may affect company to loss in term of financial | Supplier bankrupt | | |
| | | Excessive handling in border area in term of changing vehicle | | |
| | | Global financial crisis | | |
| | | Exchange rate fluctuation | | |

4. Delay risk

| Type | Description | Risk Driver | Yes | No |
|---|---|---|---|---|
| Delay | The event that can affect to delay on delivery time or schedule | Too long technical evaluation | | |
| | | Uncertainly container loading time | | |
| | | Too long customs process in border area | | |
| | | Container was opened during transport | | |
| | | Delay on time delivery ( supplier) | | |
| | | Delay on time delivery ( non-supplier) | | |
| | | Delay document process | | |
| | | Manufacturing delay | | |
| | | Warehouse operation delay | | |
| | | Too long queuing time in border checkpoint | | |
| | | Delay due to problem with custom | | |

5. Strategy risk

| Type | Description | Risk Driver | Yes | No |
|---|---|---|---|---|
| Strategy | Risk from business implementation base on business strategy | Lack of predictive maintenance | | |
| | | Low commitment of partners | | |
| | | Unclear strategic plan | | |
| | | Lack of integration with supplier | | |
| | | Inflexibility resource | | |
| | | Rapidly change transport route | | |

6. Capacity risk

| Type | Description | Risk Driver | Yes | No |
|---|---|---|---|---|
| Capacity | Risk from unclear of capacity plan | Over load facility capacity | | |
| | | Highways and cities overloaded restriction with vehicles across the country | | |

7. Political risk

| Type | Description | Risk Driver | Yes | No |
|---|---|---|---|---|
| Political | Risk from uncertainty of political | Government regulation | | |
| | | Politics Problem | | |
| | | Regional instability | | |

8. Regulation risk

| Type | Description | Risk Driver | Yes | No |
|---|---|---|---|---|
| Legal | Risk which relate to the laws | Intellectual property breaches | | |
| | | Litigation from customers, suppliers, shareholders or employees | | |
| | | Driver breach traffic rule | | |

9. System risk

| Type | Description | Risk Driver | Yes | No |
|---|---|---|---|---|
| System | Risk from the error of system | Discrepancy between real data and data in the system | | |
| | | Breakdown custom system | | |
| | | Electricity fail | | |
| | | System error | | |
| | | Lack of appropriate IT | | |
| | | Breakdown IT system | | |

10. Marketing risk

| Type | Description | Risk Driver | Yes | No |
|---|---|---|---|---|
| Market | Risk involve to marketing | Increasing competitor | | |
| | | Customer decline | | |

**แบบสอบถามงานวิจัย**

เพื่อศึกษาลำดับความสำคัญของแต่ละปัจจัยความเสี่ยงสำหรับผู้ให้บริการด้านโลจิสติกส์

แบบสอบถามนี้เป็นส่วนหนึ่งในการทำวิทยานิพนธ์มหาบัณฑิต ของหลักสูตรวิศวกรรมศาสตร์มหาบัณฑิต ภาควิชาวิศวกรรมอุตสาหการ โดยมีวัตถุประสงค์ดังนี้

1) เพื่อศึกษาปัจจัยความเสี่ยงในการดำเนินงานของผู้ให้บริการด้านโลจิสติกส์ในไทยในการให้บริการขนส่งสินค้าขาออกทางรถบรรทุก
2) เพื่อจัดลำดับปัจจัยความเสี่ยงแต่ละตัวตามระดับของความรุนแรงและโอกาสที่จะเกิดของแต่ละปัจจัย
3) เพื่อเสนอแนวทางจัดการปัจจัยความเสี่ยงที่อยู่ในระดับสูง

ขอบเขตงานวิจัย

งานวิจัยนี้สนใจศึกษาความเสี่ยงและเสนอวิธีการจัดการความเสี่ยงสำหรับผู้ให้บริการโลจิสติกส์อันจะส่งผลให้มีความสามารถในการแข่งขันสูงขึ้น โดยมุ่งประเด็นไปที่การขนส่งสินค้าขาออกโดยรถบรรทุกเท่านั้น

โดยงานวิจัยนี้ได้จัดประเภทความเสี่ยงออกเป็น 7 ประเภท ได้แก่

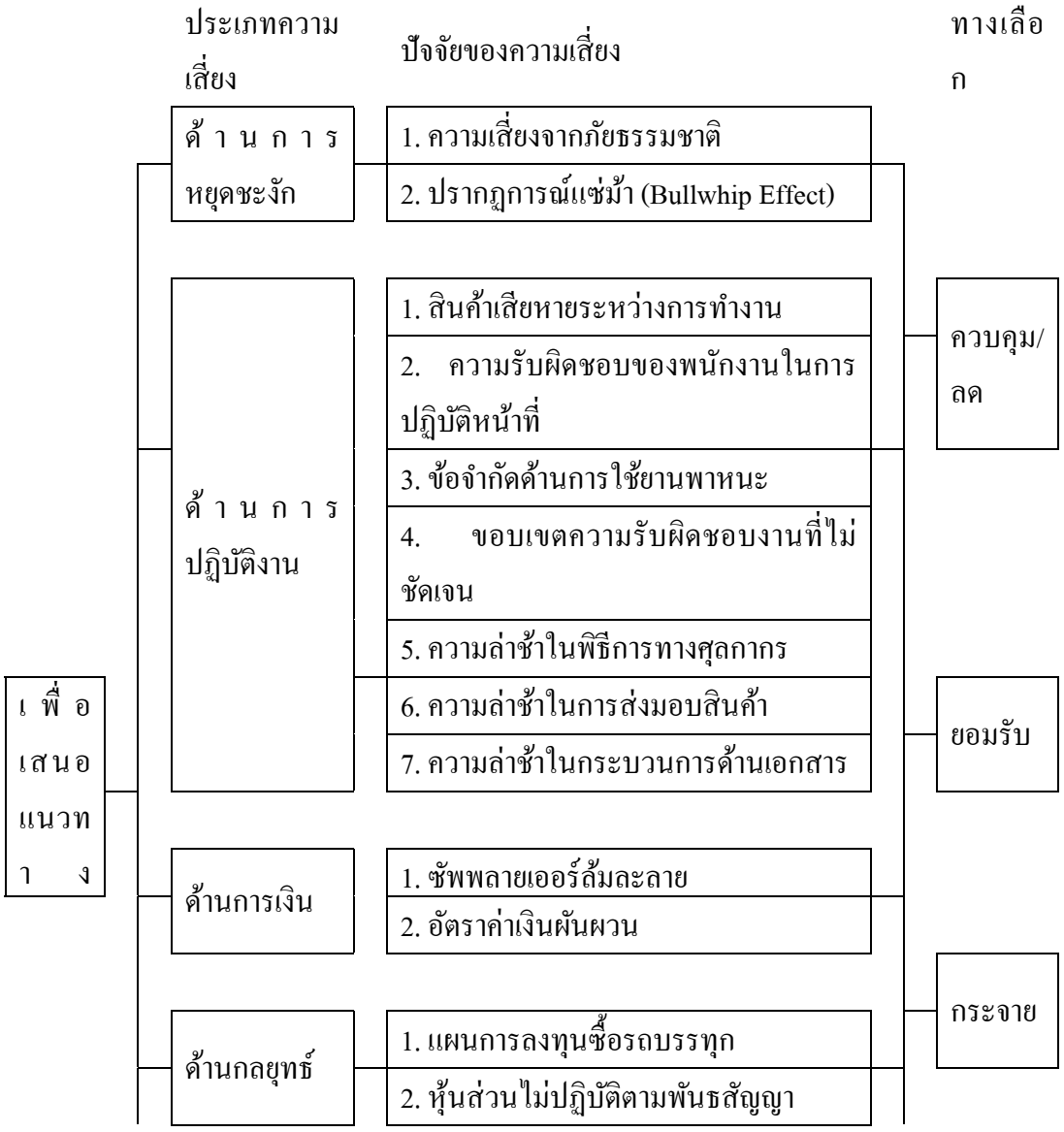
| ประเภทความเสี่ยง | คำอธิบาย |
|---|---|
| ด้านการหยุดชะงัก | ความเสี่ยงที่ไม่สามารถควบคุมได้และอาจส่งผลให้ซัพพลายเชนหยุดชะงัก |
| ด้านการปฏิบัติงาน | ความเสี่ยงที่เกิดจากคนหรือยานพาหนะในกระบวนการทำงานอันนำมาสู่ความสูญเสียต่อบริษัท |
| ด้านการเงิน | ความเสี่ยงทางด้านการเงิน |
| ด้านกลยุทธ์ | ความเสี่ยงทางด้านกลยุทธ์และการวางแผนการดำเนินงาน |
| ด้านระเบียบข้อบังคับ | ความเสี่ยงทางด้านกฎระเบียบและนโยบาย |
| ด้านระบบ | ความเสี่ยงอันเนื่องมาจากระบบเทคโนโลยีและสารสนเทศ |
| ด้านการตลาด | ความเสี่ยงในด้านของมูลค่าการตลาด |

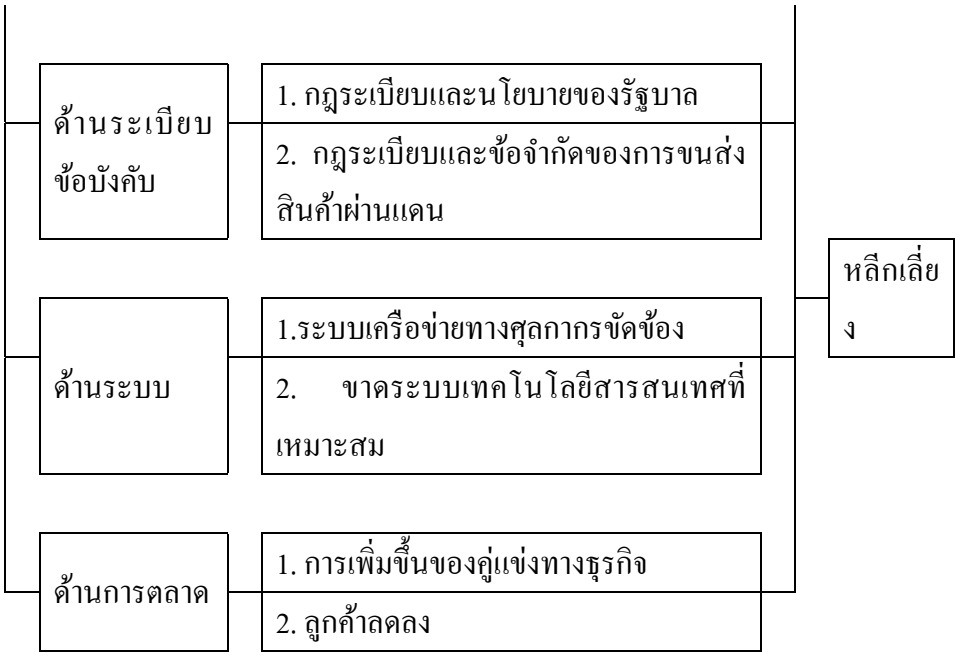
ข้อมูลของท่านผู้ตอบแบบสอบถาม จะถูกเก็บไว้เป็นความลับ จึงไม่มีผลกระทบใดๆต่อท่านผู้ตอบแบบสอบถาม

ค่

สำหรับแบบสอบถามประเมินความเสี่ยงของการขนส่งสินค้าขาออกทางรถบรรทุกนี้ จะพิจารณาความเสี่ยงออกเป็น 2 มิติ คือ มิติด้านความรุนแรง และมิติด้านโอกาสที่จะเกิดขึ้น โดยมิติด้านความรุนแรงจะใช้เทคนิคการตัดสินใจโดยใช้กระบวนการลำดับชั้นเชิงวิเคราะห์ Analytical Hierarchy Process (AHP) ในการวิเคราะห์ ส่วนในมิติด้านโอกาสใช้ Likert Scale โดยโครงสร้างลำดับชั้นเชิงวิเคราะห์เป็นดังภาพที่ 1

ภาพที่ 1โครงสร้างลำดับชั้นเชิงวิเคราะห์ Analytical Hierarchy Process (AHP)






เกณฑ์การจัดลำดับความสำคัญของ มิติที่ 1. ด้านความรุนแรงของความเสี่ยง (Severity)

สำหรับคำถามในแบบสอบถามนี้จะใช้การเปรียบเทียบความสำคัญของปัจจัยเป็นคู่ๆ โดยท่านจะต้องเปรียบเทียบความสำคัญด้านความรุนแรงของความเสี่ยงดังแสดงดังตัวเลขในตาราง

เกณฑ์มาตรฐานในการเปรียบเทียบความสำคัญ

| ระดับความสำคัญ | ความหมาย | คำอธิบาย |
|---|---|---|
| 1 | - สำคัญเท่ากัน | ปัจจัยทั้งสองมีความสำคัญเท่าเทียมกัน |
| 3 | - สำคัญกว่าพอประมาณ | ปัจจัยตัวที่หนึ่งมีความสำคัญมากกว่าปัจจัยอีกตัวหนึ่งพอประมาณ |
| 5 | - สำคัญกว่าอย่างเด่นชัด | ปัจจัยตัวที่หนึ่งมีความสำคัญมากกว่าปัจจัยอีกตัวหนึ่งอย่างเด่นชัด |
| 7 | - สำคัญกว่าอย่างเด่นชัดมาก | ปัจจัยตัวที่หนึ่งมีความสำคัญมากกว่าปัจจัยอีกตัวหนึ่งอย่างเด่นชัดมาก |
| 9 | - สำคัญกว่าอย่างมากที่สุด | ปัจจัยตัวที่หนึ่งมีความสำคัญมากกว่าปัจจัยอีกตัวหนึ่งอย่างมากที่สุด |
| 2, 4, 6, 8 | - ค่าความสำคัญระหว่างกลางของค่าที่กล่าวไว้ข้างต้น | ค่าความสำคัญของการเปรียบเทียบปัจจัยเป็นค่าระหว่างกลางของค่าที่กล่าวไว้ข้างต้น |

เกณฑ์การจัดลำดับความสำคัญของ มิติที่ 2. ด้านโอกาสที่จะเกิด (Probability)

| ระดับความสำคัญ | ความหมาย |
|---|---|
| 1 | มีโอกาสเกิดน้อยมากหรือแทบไม่เคยเกิด |
| 2 | มีโอกาสเกิดน้อย |
| 3 | มีโอกาสเกิดปานกลาง |
| 4 | มีโอกาสเกิดบ่อย |
| 5 | มีโอกาสเกิดบ่อยมากที่สุด |

**วิธีการตอบแบสอบถาม**

ในการเปรียบเทียบระหว่างปัจจัยที่ 1 และ ปัจจัยที่ 2 ถ้าท่านเห็นว่าปัจจัยที่ 1 มีความสำคัญกว่าอย่างสูงที่สุดเมื่อเปรียบเทียบกับปัจจัยที่ 2 แล้ว คำตอบของท่านจะเป็น 9 ดังแสดงในตาราง

| No. | Risk Factors | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Risk Factors |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ปัจจัยที่ 1 | X | | | | | | | | | | | | | | | | | ปัจจัยที่2 |

ในทางกลับกัน ถ้าท่านเห็นว่าปัจจัยที่ 2 มีความสำคัญมากกว่าปานกลางเมื่อเปรียบเทียบกับปัจจัยที่ 1 แล้ว คำตอบของท่านจะเป็น 1/3 ดังแสดงในตาราง

| No. | Risk Factors | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Risk Factors |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ปัจจัยที่ 1 | | | | | | | | | | | X | | | | | | | ปัจจัยที่2 |

ตอนที่ 1. เปรียบเทียบความสำคัญในระดับของปัจจัยหลัก

1. เมื่อพิจารณาปัจจัยหลักในด้านประเภทของความเสี่ยงแล้ว ความเสี่ยงประเภทใดมีความสำคัญมากกว่ากัน โดยให้ผู้ตอบแบบสอบถามเปรียบเทียบประเภทของความเสี่ยงเป็นคู่ว่าความเสี่ยงประเภทใดมีความสำคัญมากกว่ากัน

| Risk Categories | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Risk Categories |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ด้านการหยุดชะงัก | | | | | | | | | | | | | | | | | | ด้านการปฏิบัติงาน |
| ด้านการหยุดชะงัก | | | | | | | | | | | | | | | | | | ด้านการเงิน |
| ด้านการหยุดชะงัก | | | | | | | | | | | | | | | | | | ด้านกลยุทธ์ |
| ด้านการหยุดชะงัก | | | | | | | | | | | | | | | | | | ด้านระเบียบข้อบังคับ |
| ด้านการหยุดชะงัก | | | | | | | | | | | | | | | | | | ด้านระบบ |
| ด้านการหยุดชะงัก | | | | | | | | | | | | | | | | | | ด้านการตลาด |
| ด้านการปฏิบัติงาน | | | | | | | | | | | | | | | | | | ด้านการเงิน |
| ด้านการปฏิบัติงาน | | | | | | | | | | | | | | | | | | ด้านกลยุทธ์ |
| ด้านการปฏิบัติงาน | | | | | | | | | | | | | | | | | | ด้านระเบียบข้อบังคับ |
| ด้านการปฏิบัติงาน | | | | | | | | | | | | | | | | | | ด้านระบบ |
| ด้านการปฏิบัติงาน | | | | | | | | | | | | | | | | | | ด้านการตลาด |
| ด้านการเงิน | | | | | | | | | | | | | | | | | | ด้านกลยุทธ์ |

| Risk Categories | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Risk Categories |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ด้านการเงิน | | | | | | | | | | | | | | | | | | ด้านระเบียบข้อบังคับ |
| ด้านการเงิน | | | | | | | | | | | | | | | | | | ด้านระบบ |
| ด้านการเงิน | | | | | | | | | | | | | | | | | | ด้านการตลาด |
| ด้านกลยุทธ์ | | | | | | | | | | | | | | | | | | ด้านระเบียบข้อบังคับ |
| ด้านกลยุทธ์ | | | | | | | | | | | | | | | | | | ด้านระบบ |
| ด้านกลยุทธ์ | | | | | | | | | | | | | | | | | | ด้านการตลาด |
| ด้านระเบียบข้อบังคับ | | | | | | | | | | | | | | | | | | ด้านระบบ |
| ด้านระเบียบข้อบังคับ | | | | | | | | | | | | | | | | | | ด้านการตลาด |
| ด้านระบบ | | | | | | | | | | | | | | | | | | ด้านการตลาด |

ตอนที่ 2. เปรียบเทียบความสำคัญในระดับปัจจัยย่อย

1. เมื่อพิจารณาปัจจัยหลักในด้านการปฏิบัติงานแล้ว ปัจจัยย่อยใดมีความสำคัญมากกว่ากัน โดยให้ผู้ตอบแบบสอบถามเปรียบเทียบประเภทของความเสี่ยงเป็นคู่ว่าปัจจัยใดมีความสำคัญมากกว่ากัน

| | ปัจจัยความเสี่ยง | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ปัจจัยความเสี่ยง |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | สินค้าเสียหายระหว่าง | | | | | | | | | | | | | | | | | | ความรับผิดชอบของ |
| 2 | สินค้าเสียหายระหว่าง | | | | | | | | | | | | | | | | | | ข้อจำกัดด้านการใช้ |
| 3 | สินค้าเสียหายระหว่าง | | | | | | | | | | | | | | | | | | ขอบเขตความ |
| 4 | สินค้าเสียหายระหว่าง | | | | | | | | | | | | | | | | | | ความล่าช้าในพิธีการ |
| 5 | สินค้าเสียหายระหว่าง | | | | | | | | | | | | | | | | | | ความล่าช้าในการส่ง |
| 6 | สินค้าเสียหายระหว่าง | | | | | | | | | | | | | | | | | | ความล่าช้าใน |
| 7 | ความรับผิดชอบของ | | | | | | | | | | | | | | | | | | เงื่อนไขการใช้ |
| 8 | ความรับผิดชอบของ | | | | | | | | | | | | | | | | | | ขอบเขตความ |
| 9 | ความรับผิดชอบของ | | | | | | | | | | | | | | | | | | ความล่าช้าใน |

| | ปัจจัยความเสี่ยง | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ปัจจัยความเสี่ยง |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | ความรับผิดชอบของ | | | | | | | | | | | | | | | | | | ความล่าช้าในการส่ง |
| 11 | ความรับผิดชอบของ | | | | | | | | | | | | | | | | | | ความล่าช้าใน |
| 12 | ข้อจำกัดด้านการใช้ | | | | | | | | | | | | | | | | | | ขอบเขตความ |
| 13 | ข้อจำกัดด้านการใช้ | | | | | | | | | | | | | | | | | | ความล่าช้าในพิธีการ |
| 14 | ข้อจำกัดด้านการใช้ | | | | | | | | | | | | | | | | | | ความล่าช้าในการส่ง |
| 15 | ข้อจำกัดด้านการใช้ | | | | | | | | | | | | | | | | | | ความล่าช้าใน |
| 16 | ขอบเขตความ | | | | | | | | | | | | | | | | | | ความล่าช้าในพิธีการ |
| 17 | ขอบเขตความ | | | | | | | | | | | | | | | | | | ความล่าช้าในการส่ง |
| 18 | ขอบเขตความ | | | | | | | | | | | | | | | | | | ความล่าช้าใน |
| 19 | ความล่าช้าในพิธีการ | | | | | | | | | | | | | | | | | | ความล่าช้าในการส่ง |
| 20 | ความล่าช้าในพิธีการ | | | | | | | | | | | | | | | | | | ความล่าช้าใน |
| 21 | ความล่าช้าในการส่ง | | | | | | | | | | | | | | | | | | ความล่าช้าใน |

2. เมื่อพิจารณาปัจจัยหลักในด้านการหยุดชะงักแล้ว ปัจจัยย่อยใดมีความสำคัญมากที่สุด โดยให้ผู้ตอบแบบสอบถามเปรียบเทียบประเภทของความเสี่ยงเป็นคู่ว่าปัจจัยใดมีความสำคัญมากกว่ากัน

| No. | ปัจจัยความเสี่ยง | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ปัจจัยความเสี่ยง |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ความเสี่ยงจากภัยธรรมชาติ | | | | | | | | | | | | | | | | | | ปรากฏการณ์แซ่ม้า (Bullwhip Effect) |

3. เมื่อพิจารณาปัจจัยหลักในด้านการเงินแล้ว ปัจจัยย่อยใดมีความสำคัญมากที่สุด โดยให้ผู้ตอบแบบสอบถามเปรียบเทียบประเภทของความเสี่ยงเป็นคู่ว่าปัจจัยใดมีความสำคัญมากกว่ากัน

| No. | ปัจจัยความเสี่ยง | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ปัจจัยความเสี่ยง |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ซัพพลายเออร์ล้มละลาย | | | | | | | | | | | | | | | | | | อัตราค่าเงินผันผวน |

4. เมื่อพิจารณาปัจจัยหลักในด้านกลยุทธ์แล้ว ปัจจัยย่อยใดมีความสำคัญมากที่สุด โดยให้ผู้ตอบแบบสอบถามเปรียบเทียบประเภทของความเสี่ยงเป็นคู่ว่าปัจจัยใดมีความสำคัญมากกว่ากัน

| No. | ปัจจัยความเสี่ยง | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ปัจจัยความเสี่ยง |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | แผนการลงทุนซื้อรถบรรทุก | | | | | | | | | | | | | | | | | | หุ้นส่วนไม่ปฏิบัติตามพันธสัญญา |

5. เมื่อพิจารณาปัจจัยหลักในด้านกฎระเบียบข้อบังคับแล้ว ปัจจัยย่อยใดมีความสำคัญมากที่สุด โดยให้ผู้ตอบแบบสอบถามเปรียบเทียบประเภทของความเสี่ยงเป็นคู่ว่าปัจจัยใดมีความสำคัญมากกว่ากัน

| No. | ปัจจัยความเสี่ยง | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ปัจจัยความเสี่ยง |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | กฎระเบียบและนโยบายของรัฐบาล | | | | | | | | | | | | | | | | | | กฎระเบียบและข้อจำกัดของการขนส่งสินค้าผ่านแดน |

6. เมื่อพิจารณาปัจจัยหลักในด้านระบบแล้ว ปัจจัยย่อยใดมีความสำคัญมากที่สุด โดยให้ผู้ตอบแบบสอบถามเปรียบเทียบประเภทของความเสี่ยงเป็นคู่ว่าปัจจัยใดมีความสำคัญมากกว่ากัน

| No. | ปัจจัยความเสี่ยง | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ปัจจัยความเสี่ยง |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ระบบเครือข่ายทางศุลกากรขัดข้อง | | | | | | | | | | | | | | | | | | ขาดระบบเทคโนโลยีสารสนเทศที่เหมาะสม |

7. เมื่อพิจารณาปัจจัยหลักในด้านการตลาดแล้ว ปัจจัยย่อยใดมีความสำคัญมากที่สุด โดยให้ผู้ตอบแบบสอบถามเปรียบเทียบประเภทของความเสี่ยงเป็นคู่ว่าปัจจัยใดมีความสำคัญมากกว่ากัน

| No. | ปัจจัยความเสี่ยง | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ปัจจัยความเสี่ยง |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | การเพิ่มขึ้นของคู่แข่ง | | | | | | | | | | | | | | | | | | ลูกค้าลดลง |

**มิติที่ 2. ด้านโอกาสที่จะเกิด (Probability)**

เมื่อพิจารณาปัจจัยของความเสี่ยงแล้ว ปัจจัยความเสี่ยงประเภทใดมีโอกาสเกิดมากที่สุด โดย 1หมายถึงปัจจัยความเสี่ยงนั้นมีโอกาสเกิดน้อยมากหรือแทบไม่เคยเกิด และ 5 หมายถึงปัจจัยเสี่ยงนั้นมีโอกาสเกิดมากที่สุด

| ประเภท | ปัจจัยความเสี่ยง | โอกาสที่จะเกิด | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| การหยุดชะงัก | 1. ความเสี่ยงจากภัยธรรมชาติ | | | | | |
| | 2. ปรากฏการณ์แซ่ม้า (Bullwhip Effect) | | | | | |
| การปฏิบัติงาน | 3. สินค้าเสียหายระหว่างการทำงาน | | | | | |
| | 4. ความรับผิดชอบของพนักงานในการปฏิบัติหน้าที่ | | | | | |
| | 5. ข้อจำกัดด้านการใช้ยานพาหนะ | | | | | |
| | 6. ขอบเขตความรับผิดชอบงานที่ไม่ชัดเจน | | | | | |
| | 7. ความล่าช้าในพิธีการทางศุลกากร | | | | | |
| | 8. ความล่าช้าในการส่งมอบสินค้า | | | | | |
| | 9. ความล่าช้าในกระบวนการด้านเอกสาร | | | | | |
| การตลาด | 10. ซัพพลายเออร์ล้มละลาย | | | | | |
| | 11. อัตราค่าเงินผันผวน | | | | | |
| กลยุทธ์ | 12. แผนการลงทุนซื้อรถบรรทุก | | | | | |
| | 13. หุ้นส่วนไม่ปฏิบัติตามพันธสัญญา | | | | | |

| ประเภท | ปัจจัยความเสี่ยง | โอกาสที่จะเกิด | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| กฎระเบียบข้อบังคับ | 14. กฎระเบียบและนโยบายของรัฐบาล | | | | | |
| | 15. กฎระเบียบและข้อจำกัดของการขนส่งสินค้าผ่านแดน | | | | | |
| ระบบ | 16. ระบบเครือข่ายทางศุลกากรขัดข้อง | | | | | |
| | 17. ขาดระบบเทคโนโลยีสารสนเทศที่เหมาะสม | | | | | |
| การตลาด | 18. การเพิ่มขึ้นของคู่แข่ง | | | | | |
| | 19. ลูกค้าลดลง | | | | | |

ทั้งนี้ขอขอบพระคุณท่านเป็นอย่างยิ่งที่ให้ความอนุเคราะห์ข้อมูลในการทำวิทยานิพนธ์

**แบบสอบถามงานวิจัย**

**เพื่อศึกษาแนวทางการบริหารจัดการความเสี่ยงสำหรับผู้ให้บริการด้านโลจิสติกส์**

แบบสอบถามนี้เป็นส่วนหนึ่งในการทำวิทยานิพนธ์มหาบัณฑิต ของหลักสูตรวิศวกรรมศาสตร์มหาบัณฑิต ภาควิชาวิศวกรรมอุตสาหการ มหาวิทยาลัยมหิดลโดยมีวัตถุประสงค์ดังนี้

4) เพื่อศึกษาปัจจัยความเสี่ยงในการดำเนินงานของผู้ให้บริการด้านโลจิสติกส์ในไทยในการให้บริการขนส่งสินค้าขาออกทางรถบรรทุก
5) เพื่อจัดลำดับปัจจัยความเสี่ยงแต่ละตัวตามระดับของความรุนแรงและโอกาสที่จะเกิดของแต่ละปัจจัย
6) เพื่อเสนอแนวทางจัดการปัจจัยความเสี่ยงที่อยู่ในระดับสูง

ขอบเขตงานวิจัย

งานวิจัยนี้สนใจศึกษาความเสี่ยงและเสนอวิธีการจัดการความเสี่ยงสำหรับผู้ให้บริการด้านโลจิสติกส์อันจะส่งผลให้มีความสามารถในการแข่งขันสูงขึ้น โดยมุ่งประเด็นไปที่การขนส่งสินค้าขาออกโดยรถบรรทุกเท่านั้น

ข้อมูลของท่านผู้ตอบแบบสอบถาม จะถูกเก็บไว้เป็นความลับ จึงไม่มีผลกระทบใดๆต่อท่านผู้ตอบแบบสอบถาม

**คำชี้แจง**

สำหรับแบบสอบถามแนวทางการจัดการความเสี่ยงของการขนส่งสินค้าขาออกทางรถบรรทุกนี้มีทั้งหมด 1 ตอน โดยใช้คำถามแบบปลายเปิด (Open Ended Question) ซึ่งจะสอดคล้องกับวัตถุประสงค์งานวิจัยข้อที่ 3. เพื่อให้ผู้ตอบแบบสอบถามเสนอแนวทางจัดการปัจจัยความเสี่ยงที่เหมาะสม เพื่อผู้ให้บริการด้านโลจิสติกส์ของไทยนำไปวางแผนกลยุทธ์ เพื่อเพิ่มประสิทธิภาพและสร้างความได้เปรียบในการแข่งขัน

โดยสำหรับการจัดการความเสี่ยงนั้น จะอ้างอิงจากทฤษฎี 4Ts ซึ่งเป็นวิธีตอบสนองต่อความเสี่ยงที่อาจเกิดขึ้น ได้แก่ การควบคุมหรือลดความเสี่ยง (Treat) การยอมรับความเสี่ยงนั้นๆ (Take) การถ่ายโอนความเสี่ยง (Transfer) และการหลีกเลี่ยงความเสี่ยง (Terminate) โดยจะหาการจัดการความเสี่ยงที่เหมาะสมสำหรับแต่ละปัจจัยโดยมีรายละเอียดดังนี้

1. **การควบคุมหรือลดความเสี่ยง (Treat)** เป็นการลดโอกาสที่จะเกิดความเสี่ยง หรือลดความรุนแรงของผลกระทบที่จะเกิดขึ้น เพื่อให้ความเสี่ยงอยู่ในระดับที่ยอมรับได้ โดยการออกแบบระบบควบคุม/กำหนดกิจกรรมควบคุม การแก้ไขปรับปรุงกระบวนการทำงาน การกำหนดแผนสำรองฉุกเฉิน
2. **การยอมรับความเสี่ยง (Take)** เป็นการยอมให้ความเสี่ยงเกิดขึ้น หรือยอมรับความเสี่ยงที่เกิดจากการปฏิบัติงานภายใต้ระดับความเสี่ยงที่องค์กรสามารถยอมรับได้ เนื่องจากค่าใช้จ่ายในการจัดการ/ควบคุมความเสี่ยงอาจมีมูลค่าสูงกว่าผลประโยชน์ที่ได้ โดยมีการกำหนดมาตรการติดตามดูแล และกำหนดระดับของผลกระทบที่ยอมรับได้
3. **การกระจาย/โอนความเสี่ยง (Transfer)** เป็นการโอนความเสี่ยงให้กับบุคคลที่สามช่วยรับผิดชอบ โดยการทำประกันภัย การจ้างบริการ /จ้างบุคคลภายนอกดำเนินการแทนการทำสำเนาเอกสารหลายๆ ชุด การบริหารสัญญา
4. **การหลีกเลี่ยงความเสี่ยง (Terminate)** เป็นการยุติไม่ให้ความเสี่ยงเกิดขึ้น หรือหลีกเลี่ยงความเสี่ยงโดยหยุดหรือเปลี่ยนรูปแบบการทำกิจกรรมที่จะก่อให้เกิดความเสี่ยงหรือเปลี่ยนวัตถุประสงค์

**ตอนที่ 1 จากปัจจัยความเสี่ยงดังกล่าว ท่านมีแนวทางในการจัดการความเสี่ยงเหล่านี้อย่างไร ท่านสามารถเลือกตอบได้มากกว่า 1 วิธีพร้อมอธิบายคร่าวๆ**

| ลำดับที่ | ปัจจัยความเสี่ยง | ลด/ควบคุมความเสี่ยง | ยอมรับความเสี่ยง | กระจายความเสี่ยง | หลีกเลี่ยงความเสี่ยง |
|---|---|---|---|---|---|
| 1 | ปรากฏการณ์แซ่ม้า (Bullwhip Effect) | | | | |
| 2 | ระบบเทคโนโลยีสารสนเทศภายในขาดประสิทธิภาพ | | | | |
| 3 | ซับคอนแทรคเตอร์ล้มละลาย | | | | |
| 4 | หุ้นส่วนไม่ปฏิบัติตามพันธะสัญญา | | | | |
| 5 | ความเสี่ยงจากภัยธรรมชาติ | | | | |
| 6 | การเพิ่มขึ้นของคู่แข่งทางธุรกิจ | | | | |
| 7 | อัตราค่าเงินผันผวน | | | | |
| 8 | สินค้าเสียหายระหว่างการทำงาน | | | | |
| 9 | ระบบเครือข่ายศุลกากรขัดข้อง | | | | |

# BIOGRAPHY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Thesis
entitled

# RISK MANAGEMENT FOR LOCAL LOGISTICS SERVICE PROVIDER FOCUSING ON OUTBOUND ROAD FREIGHT TRANSPORTATION

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