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RISK AND CONSEQUENCE IN SUPPLY CHAIN IN ARAMCO COMPANY

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ABSTRACT

Supply risk have multiple resources such as process, control, demand, supply and environment. In addition, supply risks are key challenges to supply chain management. The ability to identify these risks was the first step in managing risk. These risks had significantly negative impact on the supply chain. The study aimed to determine the risks and consequences that supply chain faces in Aramco Saudi Company. The need data had been collected based on online survey with 72 respondents. The first hypothesis in this study was test supply chain and susceptible in terms of supply chain risks. The second hypothesis was testing the relationship between the key drives of supply chain and risks. The third hypotheses was testing the relationship between the risks and internal supply chain. The fourth was test the impact of the external supply chain risks. The results shows that the acceptance of susceptible of supply chain risks. Outsourcing of supply chain and the product variants were the key drives supply chain which meant partly of hypothesis accepted, and there was a negative relationship between the risks and internal and external supply chain.

INTRODUCTION

Supply chain plays important role to keep the firm in the global market by organizing the activities from supplier to the end customer effectively [1]. Supply chain is defined as series of activities involved directly or indirectly in fulfilling a customer demand which includes supplier, manufacturer, transporters, warehouses, retailers, customers and end user [2].

Supply chain risk is probability of an incident correlated with inbound supply from individual supplier failures or the supply market occurring which outcomes in the inability of the purchasing firm to meet customer demand of cause threats toward customer life and safety [3].

Besides, supply chain also is defined as potential variation of outcomes that affected decrement of added value at any activity cell in a chain [4]. Besides, supply chain risk is individual perception on total potential loss correlated with the disruption of supply of a particular purchased item from particular supplier [5].

Supply chain risks management is referred to determine and managing of the risks of supply chain by a coordinated way between supply chain groups to decrease supply chain vulnerability [6,7]. SCM also known as planning, arrangement, realization and control of product flow ranges from design and purchasing through production and distribution to final consumer [8]. Management of supply chain is responsible for coordination and integration do all activities [9]. SCM have involves integrating corporate functions using business processes within and across companies [10].

In general, supply chain risk is divided into two types included internal and external risks [11]. Internal risk is defined as operational risk that happened inside the organization such as financial risk, quality risk, poor forecast, demand risk and late delivery, External risk is more on results came outside the organization such as terrorist attacks, strikes, earthquakes and flood. Besides, risks also related to material flow, financial flow and information flow risks [12].

Risk management is process which organization identify measure, prioritize and mitigate the unfavorable effect of uncertainties [13]. Risk management also defined as decision making process in a way to make sure highest level of security by decreasing anticipated factors impact on the functioning economic entity [14]. Mitigating risk in a project improves the likelihood of success in that project [15]. Risk management causes by several factors such as degree of product technology; defined as the degree of change and complexity of product, need for security to ensure the package and transport of the product, importance of the supplier depends on regular and critical supply of commodities while purchasers' prior experience depend on significant experience.

Risk also correlated wit traditional logistics concept such as cost, time, quality, agility and leanness. Supply chain risks need to have trade-off analysis on accessing new logistics solutions to find the efficient level of risk and prevention. In addition, the insurance company need to be driving force that works with supply chain risk management to reduce the risks. The risk has relationship with three types of collaboration which are supplier collaboration, customer collaboration and internal collaboration.

This study had analyzed the risk of supply chain on company. A questionnaire also developed based on literature review that answered by supply managers of the Saudi Aramco company. The study aimed to determine the risks and consequences that supply chain faces in Aramco Saudi Company.

METHODOLOGY

There were two types of research methods such as qualitative research and quantitative research methods. The qualitative research method was investigated attitudes, beliefs, facts and experiences collected the data through the method such as an interview or focus groups. Quantitative research methods were depending on the quantity measurement.

The study aimed to identifying the risk and consequences that faced by Aramco company with following hypotheses has been developed as shown in Table 1.

Table 1. Study Hypothesis

Hypotheses
H1: Supply chain regarded as being susceptible in terms of supply chain risks.
H2: The complexity and efficiency are key drivers for supply chain risks.
H3: Internal supply chain risks had higher likelihood to occur than external supply chain risks.
H4: External supply chain risks had greater impact on supply chain than internal supply chain risks.

There were main two sources of information were classified as primary and second data. Primary research was study of a subject that observation and investigation.

There were two main observation included direct observation and participant observation. The direct observation used more in areas such as psychology and health. In participant observation, the lives of people being observed. The advantage of observation record the information in time of observed the individuals to study their current behavior and people who had hard express their idea.

Meanwhile, three types interview such as structured interviews, unstructured interviews and semi- structured. Structured interviews method used in quantitative research which asked participants questions close-end options.
Secondary data was depended on previous studies and research. The sources of secondary research categorized as internal and external sources. Internal sources were data that available inside the research organization.

The methodology was used in this study was quantitative methods questioner tool, collected the data from online survey with close-end questions. The population were Aramco Company employees. The samples were 200 employees.

RESULT AND DISCUSSION

Result

In Table 1, the result was observed the drives supply chain risks that acceptable level of the reliability Cornbrash's alpha> 0.70.

Table 1. Reliability Analysis Of Drives Of Supply Chain

Variable	Cornbrash's alpha
Drives	0.828

In Table 2, consequences that acceptable level of the reliability Cornbrash's alpha>0.70.

Table 2. Reliability Analysis Of Consequences

Variable	Cornbrash's alpha
Consequences	0.889

In Figure 1, the trend towards outsourcing of supply chain and product variants had highest means values. The factor increased the complexity of the supply chain had regards as key drivers for supply chain risks. Besides, the approaches for building up a lean supply chain such as globalization, central distribution and reduction of suppliers were drivers of supply chain risks.

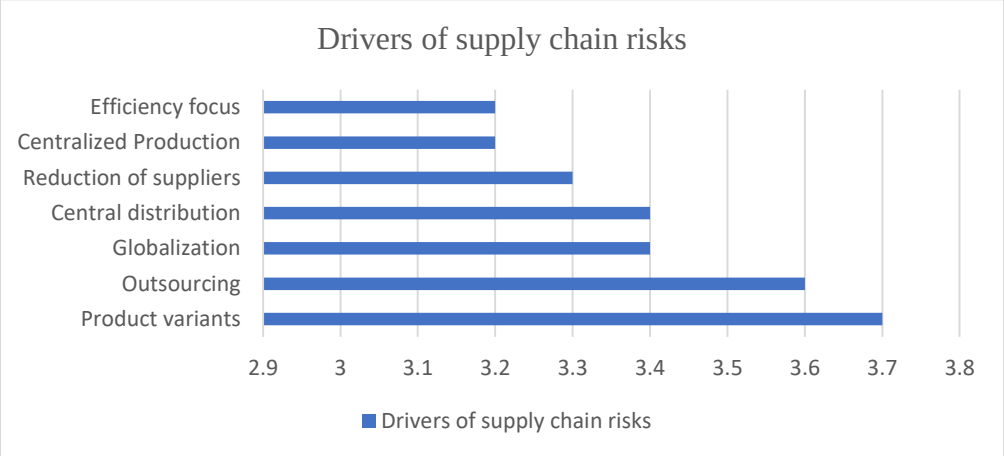

Figure 1. Drivers Of Supply Chain Risks.

The average value of all respondents was 2.43 on five point Likert-scale. There were 52.8% respondents had highly vulnerable. Moreover, 12.5% respondents estimated their supply chain as being little at all susceptible in terms of supply chain disruptions.

The study had provided probability-impact matrix to give experimental evidence on potential risk a company might confronted with different risks. The PIM chart is based on the principle that a risk had two dimensions of probability and impact. Figure 2 showed risk and consequences that were in the company in terms of internal and external supply chain risks.

In Figure 2, there were many different of risks that available on supply chain. All risks had same impact, consequence and degree of the risk.

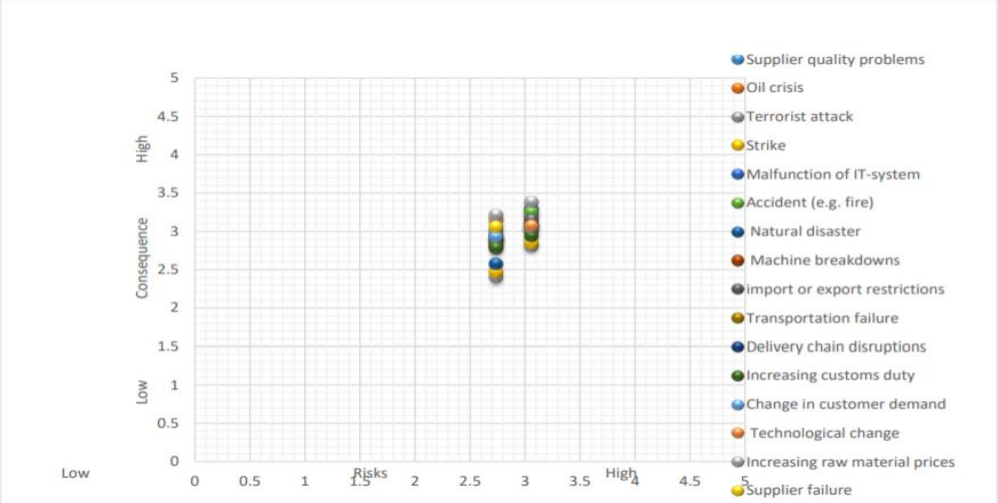

Figure 2. Probability Impact Of Risks.

In Table 2, 16 respondents were strongly agreed and 25 respondents were neutral on vulnerable for supply chain risks. There were 23 respondents agreed and 18 respondents were disagreed on focused on efficiency instead of security aspects. In addition, 16 were strongly agreed and 21 respondents were neutral on globalization of supply chain. Furthermore, 26 respondents were neutral and 3 respondents were strongly disagreed on focused on central distribution.

Three respondents were strongly disagreed and 17 respondents agreed for in forced outsourcing. There were 20 respondents neutral and 17 respondents agreed on reduction of supplier. A respondent was strongly disagreed and 19 respondents were neutral on increased product variety. Furthermore, 14 respondents were disagreed and 12 respondents were strongly agreed on centralized production. Three respondents were strongly disagreed and 23 respondents agreed on typical risks and consequences.

Table 2. Descriptive Statistics Of Supply Chain Risks

Variable	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
Vulnerable	16	22	25	5	4
Focus on efficiency instead of security aspects	9	23	18	18	4
Globalization of supply chain	16	18	21	14	3

Focus on central distribution	15	18	26	10	3
In forced outsourcing	20	17	20	12	3
Reduction of suppliers	15	17	20	15	5
Increased product variety	20	20	19	12	1
Centralized production	12	16	25	14	5
Typical risks and consequences	11	23	29	6	3

In Table 3, there were 9 respondents mentioned very low probability and 31 respondents mentioned normal probability on the supplier failure. There were 28 respondents mentioned normal probability and 6 respondents mentioned very high in probability for oil crisis. In addition, 9 respondents mentioned very low in probability and 20 respondents mentioned high probability in supplier quality problem. Six respondents had mentioned very high probability and 21 respondents mentioned very low probability in terrorist attack. Meanwhile, 17 respondents mentioned very low and 31 respondents mentioned normal probability in strike.

There were 27 respondents mentioned normal probability and 22 respondents mentioned low probability in malfunction of IT-system. Furthermore, 28 respondents mentioned normal probability and 17 respondents mentioned high probability in accident. In nature disaster variable, 15 respondents mentioned very low and 35 respondents mentioned normal probability. Machine breakdowns had 15 respondents mentioned low probability and 4 respondents mentioned very high probability.

Moreover, 15 respondents mentioned low probability and 24 respondents mentioned normal probability in technology change. There were 19 respondents mentioned normal probability and 12 respondents mentioned very high probability in increased raw material prices.

Table 3. Descriptive Statistics Of Probability

Variable	**Very low**	**Low**	**Normal**	**High**	**Very high**
Supplier failure	9	18	31	11	3
Supplier quality problems	9	18	21	20	4
Oil crisis	12	13	28	13	6
Terrorist attack	21	19	20	6	6
Strike	17	16	31	4	4
Malfunction of IT-system	5	22	27	13	5
Accident	13	6	28	17	8
Natural disaster	15	12	35	8	2

Machine breakdowns	7	15	30	16	4
Import or export restrictions	10	14	28	14	8
Transportation failure	9	19	25	15	4
Delivery chain disruptions	9	17	24	14	8
Increasing customs duty	12	18	22	14	6
Change in customer demand	10	15	26	12	6
Technological change	5	15	24	20	8
Increasing raw material prices	4	19	19	18	12

In Table 4, 5 respondents mentioned on very low probability and 28 respondents mentioned on normal probability in supplier quality problems. There were 18 respondents mentioned normal probability and 12 respondents mentioned very high probability in terrorist attack. Furthermore, 26 respondents mentioned normal probability and 15 respondents mentioned high probability in malfunction of IT-system.

In addition, 29 respondents mentioned normal probability and 14 respondents mentioned high probability on natural disaster. In transportation failure, 13 respondents mentioned low probability and 22 respondents mentioned high probability. Furthermore, 12 respondents mentioned low probability and 19 respondents mentioned high probability in technological change.

Table 4. Descriptive Statistics Of Consequences

Variable	**Very low**	**Low**	**Normal**	**High**	**Very high**
Supplier failure	5	17	28	13	9
Supplier quality problems	5	10	28	19	10
Oil crisis	8	7	31	15	11
Terrorist attack	18	13	18	11	12
Strike	11	16	26	11	8
Malfunction of IT-system	8	8	26	15	15
Accident	6	11	26	17	12
Natural disaster	10	9	29	14	10
Machine breakdowns	6	13	30	14	9
Import or export restrictions	10	9	23	20	10
Transportation failure	11	13	20	22	6
Delivery chain disruptions	10	9	26	20	7
Increasing customs duty	10	16	23	14	9
Change in customer demand	8	14	24	18	8
Technological change	8	12	26	19	7
Increasing raw material prices	3	14	20	23	12

DISCUSSION

The result indicated that most employees in the company confirmed high vulnerability of their supply chain. Half of respondents had highly vulnerable and only 12.5% of respondents had low supply chain vulnerability. Most managers did not regard the vulnerability of their supply chain as being low.

The risk such as environmental risk can affect the supply chain vulnerability since this risk is uncontrollable and unpredictable events [16].

Meanwhile, trend towards outsourcing of supply chain and product variants had highest mean values. Most respondents are strongly agreed that the factors that increased complexity such as outsourcing and product variants identified as key developments driving supply chain risks and vulnerability. In additions, building up a lean supply chain such as globalization, central distribution and reduction of suppliers also part of supply chain risks drivers. In terms of outsourcing raised number of interfaces and dependency between companies made supply network more vulnerable of the risks.

Besides, most respondents confirmed that very high probability of increasing in raw material prices and very low probability of terrorist attack as the drivers of supply chain risk. High raw material prices can increase the supply chain cost. Hence, the raw material management is needed and critical to overall performance of any business concern [17]. Besides, the supply chain challenging is to shorten the raw material lead times to improve product lead times for many organizations [18].

Many product variants resulted in supply chain risks since increases uncertainty in the supply chain. The score of product variants is 3.7 which is highest among other drivers of supply chain risks. The product variety impact on supply chain performance is uncertain which can cause increment inventory and out-of-stock due to high product variety [19].

The education need to provide for supplier in supplier relationship improvement. The finding also identified the risks and consequences in Aramco had negative result since depend on the data analysis found all the risks and consequences considered in the middle. This result meant none one of risks or consequences have more impact than other.

CONCLUSION

In conclusions, some employees in the company confirmed of vulnerability of their supply chain was high. There were two main factors which were outsourcing and product variants identified as key developments driving supply chain risks, increased supply chain vulnerability and complexity. Future study will be determining the relationship between the risks and drives in different industry such as electronic and automotive industries.

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