International Journal of Innovation, Creativity and Change. www.ijicc.net
Volume 14, Issue 4, 2020

The Relationship between Supply Chain Risk Management and Requirements of the Production Processes: A Case Study in The South Oil Company

Iman Asker Hawi[a], [a]Southern Technical University, Technical Institute Basra, Iraq,

This research is intended to improve the operations system performance in the South Oil Co. using the interactive relationship between the strategy of supply chain risk management and the requirements of production process flow continuation and investigation of the finding. Design/methodology/approach: Making up a conceptual model of the operation system tracks flow for South Oil Co. The model is based on the interactive relationship between the supply chain risk management strategy and the requirements of production process flow continuation. Findings: South Oil Co. has been the subject matter of the research. It lacks a conceptual pattern that systematises, integrates and directs its main components towards a comprehensive improvement of the company. In addition, it requires relative interest in the strategic role of the supply chain risk management strategy and its dual effects on both the production process and the comprehensive performance of the operations system supply chain risk management, production process flow continuation, FMEA (Failure Modes and Effects Analysis).

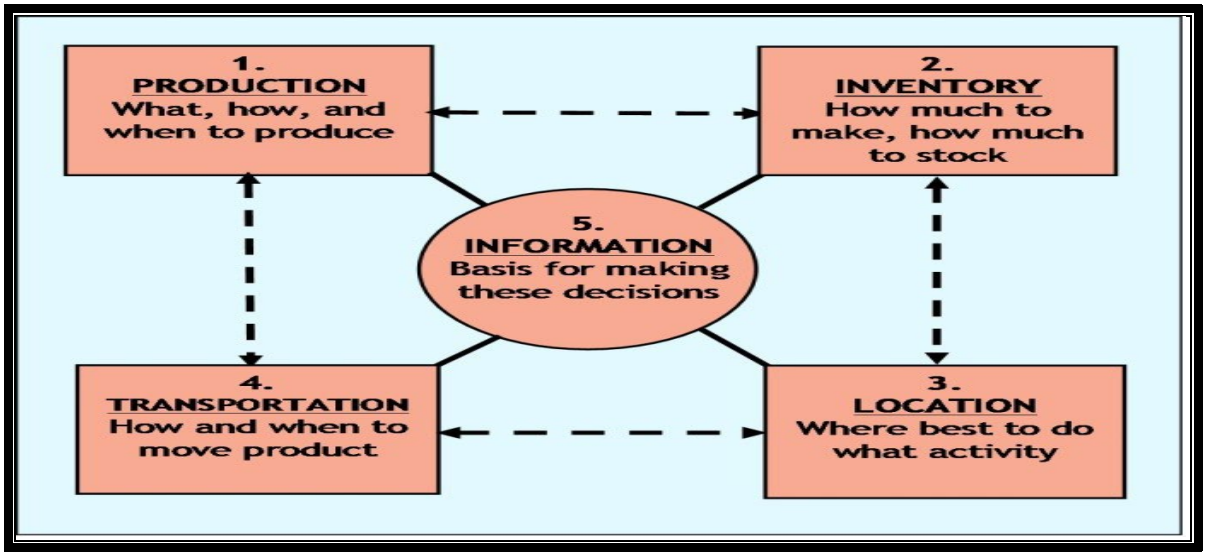
Key words: *Supply Chain, Requirements, Production Processes.*

Introduction

Today's manufacturers encounter the challenges of global markets. Limited discernment potentials of products by functionality, quality or price promote the importance of logistics performance in their supply chain as a major factor of competitiveness. Enterprises rely on the supply chain to provide them with what they need to survive, and market development and

uncertainty has increasingly evolved into supply chains, requiring organisations to be aware of how to build and engage in the supply chain to enhance their competitive advantage. Enterprises operating in the manufacturing sector are always looking for low-cost raw materials, both domestic and imported, to improve their competitive advantage. However, some organisations tend to import in a cost-effective manner such as reducing labour costs and raw materials, and distinguish (Michael , 2003) between five processes: production, inventory, location, transport and information (Figure 1). These key areas lead the supply chain:

Figure 1. Drivers of the Supply Chain, Michael H. Hugos, Essentials of supply chain management, Johan Wiley and Sons, ISB No .471–23517 – 2, New Jersey, 2003



It is noted that the supply chain coordinates production, inventory, location, transport, information and participants to achieve the best combination of responsiveness and efficiency in its management in order to produce the necessary capacity for the series. Effective management of the supply chain calls for an understanding of the work of each of the five areas and its impact on them.

The supply chain is inherently vulnerable to the risk that is constantly present, either through disturbances or uncertainties, or through interruptions. (Dani, et al., 2009) asserts that the supply chain is constantly exposed to a range of risks that can generate various forms of loss (Sodhi, 2005) with regard to related operational risks; it is noted that they are characterised by a lack of flexibility in the process of production.
According to (Speck Man et al., 2004), production refers to the capacity of the supply chain to manufacture products. The basic decision facing production managers is how to differentiate between response and efficiency, particularly with respect to production facilities (factories and warehouses). Factories and warehouses are surplus; they can be very flexible and respond quickly to large fluctuations in demand for products or are unable to respond easily to demand

fluctuations, but involve the costs and surplus energy of idle energy not in use in the production process (Suml and Meindl, 2001). The organisation whose supply chain provides a more efficient response to the needs of its customers is able to gain market share at the expense of other organisations in this market and achieve greater profitability (Tang, 2005). When vertical integration works, this leads to poor handling of processors, which puts the production process at risk of significant consequences through the lack of flexibility in production, especially if operating in an unpredictable market environment (Tomas, 2013). Achieving organisations' success in today's competitive markets requires them to learn to align their supply chains with the requirements of the markets they serve. The performance of the supply chain is a distinct competitive advantage for organisations that excel in this area and are directly linked to the improved capabilities of suppliers and continuous improvement of supply risk management reflecting the continued non-stop production process.

Supply Chain

Various factors such as globalisation, increasing product diversity, accelerating technological innovation and shortening the product lifecycle have contributed to the complexity of the formation and management of joint operations within the organisation, including such activities as procurement, logistics, distribution and new product development.

According to (Stevenson, 2002), the supply chain is defined as the sequence of organisations (their facilitations, functions, and activities) common to the production and delivery of a good or service, starting with two main suppliers of raw materials and ending with the end customer. (Slack, et al, 2004). The supply chain is the interconnection tool for organisations that connect each unit to another unit, through upstream and downstream flow links between the various processes that produce value in goods and services to the end customer.

In another context (Dawei Lu, 2011), the supply chain is a group of independent organisations associated with each other, through products/services that add value individually or collectively for delivery to the end customer, and the supply chain can be defined by (David, 2014) as diverse and long networks, interconnected with multiple layers of outsourcing and include organisations, individuals, processes, products, and services along with the infrastructure to support them. In the same vein, (Porter, 2009) refers to the supply chain as a series of activities that provide the product or service to the customer, and include these activities; sources of materials and components, manufacture of products stored in storage facilities, distribution to customers, in addition to coordinating these products through the exchange of information between each of the suppliers, distributors and customers.

Supply chain plays an important role in achieving the company's goals. Coordinating and integrating activities with suppliers and understanding customers' needs leads to greater

benefits for companies, including suppliers and customers. Strategic supplier partnerships and customer relationships are key components of supply chain management practices (Li et al., 2005), leading to information sharing, which is one of the five pillars in achieving a strong supply chain.

The supply chain has undergone major advances in transition from traditional approaches that are no longer sufficient to achieve a competitive advantage, requiring consideration of all the supply chain episodes (Pujawan, 2004). Organisations should often simplify and integrate supply chain processes through advanced concepts, conversion of supply chain from a traditional stand-alone through the integration of its components with asynchronous production processes and minimum information exchange, to integrated systems, where multiple organisations are working to facilitate simultaneous production processes and clarity of supply chain information for all, to increase demand for products (Ellinger and Kepoor, 2004).

As mentioned above, a supply chain is an integrated manufacturing process wherein raw materials are converted into final products, then delivered to customers. A supply chain is comprised of two basic, integrated processes: (1) the Production, Planning and Inventory Control Process, and (2) the Distribution and Logistics Process .These processes provide the basic framework for the conversion and movement of raw materials into final products.

A supply chain problem is a multidisciplinary problem which has common areas with many issues including marketing, management and economy. The extent of supply chain risk and uncertainty in lots of its parameters makes it more complicated. Production and delivery time, quality, safety, inventory, transportation and equipment reliability are among variables that can affect the performance of the supply chain and production process flow continuation.

Supply Chain Risk Management

Risk management in today business environment has become the biggest contributor to most fields of management (Ritchie et al, 2007). Supply chain management, as part of management study, cannot avoid those risks which are always inherent in every link in the supply chain. It is common today in supply chain management to adopt a risk concept and apply this concept as the main key role in the supply chain management (Ellegard, 2008).

Supply chain management is a very complex set of operations and functions with an enormous range of inherent risks. These can be a minor irritation as a small delay that doesn't cause a consequence or it could be a major problem such as a fire in a supplier and cause the disruption of the entire chain (Waters, 2011). Risk management is the function responsible for managing risks in organisations, meaning taking actions that reduce the consequences or probability of

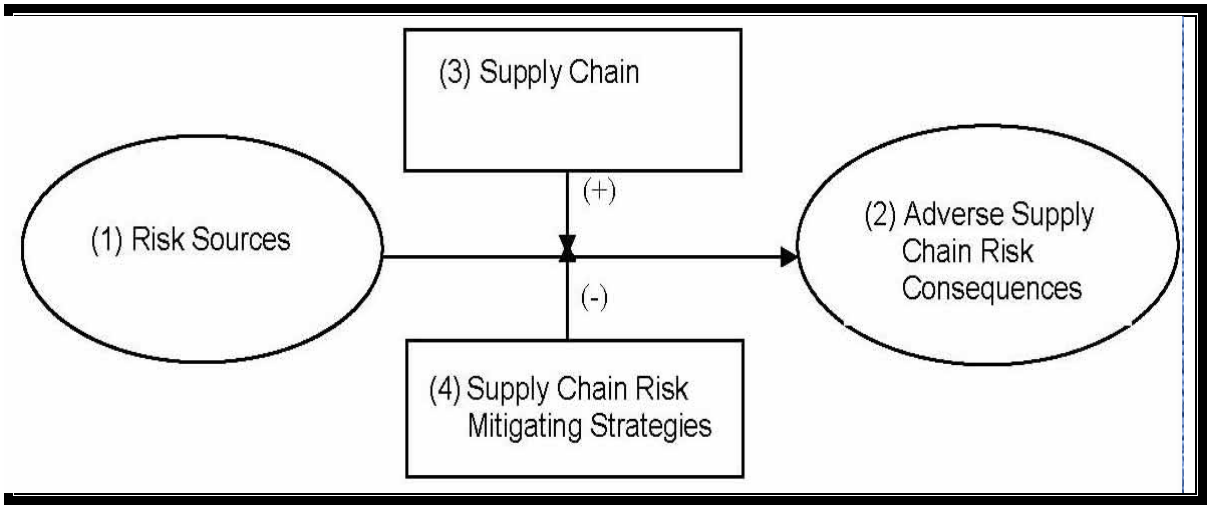
an unwanted occurrence or failure. It can also be defined as taking "actions to shift the odds in your favour" (Paulsson, 2004, Ref. The Royal Society, 1992).

To improve supply chain risk management, companies are focussing on two overarching strategies: (1) increasing logistics and supply agility by ensuring alternate suppliers, carriers routes, and the like are arranged, and (2) improving visibility and automation of supply chain activity.

It is a trap to focus risk strategies just on events that can cause extreme business disruption. It is also important to assess supply chain uncertainties that cause continual erosion of supply chain performance and can lead to domino impacts such as ballooning inventory levels, longer customer lead times that threaten sales competitiveness, or frequent budget overruns because of expedited freight and use of higher-cost secondary carriers. By mitigating both catastrophic and daily supply chain risks, a company can achieve higher speed and more dependable supply chains on a daily basis as well as have an effective business continuity plan.

The types of risk and their drivers have to be understood by the company to ensure an effective and efficient risk mitigation framework for their own company, especially for its supply chain (Chopra et al, 2004). Illustrated below in Figure 2:

Figure 2. The Basic Constructs of Supply Chain Risk Management



Source: U. Juttner, H. Peck, M. Christopher, 2003. International Journal of Logistics 6, 197-210.

The understanding of risk in the supply chain should accommodate each of these three components (Ellegard, 2008):

1. The knowledge of risk event
2. The probability of occurrence in risk event
3. The impact of risk event

The first component is initiative for increasing knowledge of risk as the prerequisite to reduce the probability of risk and the effect of it. The second component is related to reducing the probability of occurrence by implementing sets of action such as increased flounce in behaviour of third party (suppliers), joint collaboration, supplier development, and managing the relationship with them. The last component is trying to reduce the impact of the risk event, which can be done by preparing the supply strategy such as increase inventory, capacity, risk sharing, being responsive and agile, etc. (Chopra, 2004).

In conclusion, the development of supply chain risk management, as the main key role in supply chain management in today business, is supposed to take into account these components:

1. The identification of risk type and the drivers
2. The action to seek deep knowledge in risk events
3. The well-planned strategy to reduce probability of risk events
4. The preparedness of the risk impact by developing set of action related to the supply chain strategy in order to enhance sustainability in the system.

Production Process Flow Continuation

In today's world, the production process is more complex than ever before, with customers' demands for new products as well as the critical economic situation that requires organisations to be more innovative and cost-effective in purchasing and producing their products and delivering them to customers. And the role of its production process, which is still unable to address many of the challenges facing the continuity and stability of the processes.

The issue faced by organisations in the competitive environment today is the disturbances and risks associated with the production process, especially with regard to fluctuations in demand for products, which deal with the uncertain and influential conditions of production processes, and their impact on the cost of production for each product. These clearly provide the necessity to address risks, thereby reducing the impact of disturbances to ensure the continuity of the production process and enhance the performance of operations.

The quality of manufactured products depends entirely on the quality of the processes used in their industry, which represent the serial tasks and value added of the product. There are

hundreds of processes used in manufacturing. Improvements in any of these processes improve the system (Samuel, 2004). However, if production processes are at risk, they will have a significant impact, which may stop operations for a certain period and affect the organisation's supply capacity and competitive market response, and weaken the loyalty and satisfaction of its customers. There is no doubt that this weakens its position and further weakens its competitive advantage (Xuanguoxu, 2010). The issue of maintaining the flow of production processes and improving the performance of operations is not limited solely by the aforementioned, but in the systematic management of its activities in order to maintain its continuity and improve its operations continuously through the following:

Demonstrate the commitment of senior management to risk management philosophy.

- Implementing the control of documents, records and other activities of the organisation from the processing chain to the production of the finished product.
- Provide resources, including competent personnel and infrastructure, to ensure compliance with performance standards.
- Effectively control production processes to ensure customers' requirements and satisfaction.
- Identify improvement actions, including corrective actions, in order to effectively sustain the flow of production processes and improve operational performance.

Risk Failure Mode and Effect Analysis

Failure Modes and Effects Analysis (FMEA) is methodology for analysing potential reliability problems or unwanted events early in the development cycle where it is easier to take actions to overcome the problems, thereby enhancing reliability through design. FMEA is implemented to identify potential failure forms, determine their impact on the operation of the product, and identify actions to mitigate the failures (Crow, 2002). Failure mode and effect analysis is a planning tool on developing the process, products, or the services. The use of FMEA has been developed in the deployment of products or services for troubleshooting and counteractive action. The standard of FMEA evaluation is based on the occurrence, severity, and detection for each risk event. The multiplication of these values obtains the Risk Priority Number (RPN):

RPN = Occurrence x Severity x Detection

The RFMEA has developed not merely for designing services, products, and so on. Recently, RFMEA is being used for analysing potential risk in project management, marketing, operations, etc. This tool is very useful because it provides the simple method for analysing crucial steps to anticipate what might go wrong with products/services. If there is a case that

anticipating every failure mode is impossible, the development team should invent as extensive a list of potential failure modes as possible. This research implements the RFMEA framework in order to achieve the main objective of this research, that is mitigation of risk in supply chains to production process flow continuation. The overall framework of the FMEA is based on a set of steps: (Affriad Rachmatt, 2011)

Step 1: Identify the type of risk associated with each link along the supply chain. Risks along the supply chain can be classified as four (demand risk, processing risk, operational risk, environmental risk).
Step 2: Risk assessment: It means an assessment of all the risks identified in the previous step. The assessment is done by using the sum of the points to identify the probability of the risk, the level of the risk effect, and the method used to eliminate the risk effect.
Step 3: Organise the risk chain according to its priorities.

Research Design

Problem Discussion

New risk management approaches are required in the present competitive and dynamic environment. Also, the swift progress in the field of information technology opens new risks for developing effective decision support tools. Currently, most of the companies are not aware about the supply chain risks and those who are aware need knowledge to lessen and mitigate these supply chain risks. "Risk management and mitigation is the process of identifying and analysing the key threat elements within the supply chain, evaluating their results on the supply chain assets and implementing safeguards to mitigate the level of risk that the threats pose" (Pai, 2004). The field reality of the South Oil Company (Basra) showed that it faces problems and challenges (economic, environmental, social, administrative, accidents and risks imposed by the nature of its work), which is reflected in the overall deterioration in the continuous flow of the production process.

This research provides risk managers and other concerned personnel in the company a new tool to manage risks in the supply chain to production process flow continuation. The mitigation action plan may be beneficial not only for the company management but also for all the stakeholders.

Research Aim and Questions

The question this research study seeks to address is; "How can a Bio-fuels Company in Indonesia assess and mitigate the risk in its supply chain?" This broad question has to be followed by several questions, which need to be answered in advance. Those questions are as follows:

RQ-1. How is the supply chain network found in the South Oil Company?

This research tends to reveal the condition of the supply chain in South Oil Company. The main purpose of this is to identify the overall players in the supply chain in South Oil Company from the farmer, supplier, retailers, agribusiness, to the customers.

RQ-2. What kinds of risks are inherent in supply chain in South Oil Company?

The sources of risk – drivers – and the impact from these risks need to be recognised in order to develop the risk mitigation plan as the main issue in this research. Therefore, better knowledge and understanding about these risks, which is inherent in the Oil supply chain, is required.

RQ-3. What are mitigation strategies for risk in the supply chain to production process flow continuation in South Oil Company?

The risk mitigation plan has to be developed, but previously the risk assessment has to be done by using specific tools such as Risk Failure Mode and Effect Analysis. Afterwards, the mitigation plan can be developed based on the result of the risk assessment. This mitigation plan can contribute to the sustainability of the supply chain and production process flow continuation in South Oil Company.

Purpose & Objectives

The purpose of this research is to contribute to the knowledge on how to manage risks in the supply chain of South Oil Company. The objectives of the study are:

1. To identify the various supply chain risks in Oil items of South Oil Company.
2. To rank/prioritise the most important supply chain risks in oil items of South Oil Company to suggest an action plan to mitigate significant oil supply chain risks of South Oil Company.

Case Study Research

The main difference between case study research and action research is that in case study research, there should be no intervention by the researcher into the events being observed (Baskerville, 1997). Case studies can be grouped into descriptive, exploratory and explanatory (Yin, 2003) in descriptive case studies; no prior theory on the side of the researcher regarding the observed events exists. The goal is to gather some basic facts on a phenomenon to construct a preliminary theory and understanding of the events. In exploratory case studies, some prior theory exists that guides the selection of the cases and the setup of the research process. The

goal is to develop a stable theory (theory building) and/or concrete hypothesis. In explanatory case studies, prior theories and hypotheses exist, which are then tested by the cases analysed (McCutcheon and Meredith, 1993; Voss *et al.*, 2002). Similar to action research, the phases of the case study research can be divided into definition of the research question, instrument development, data gathering, data analysis and dissemination, without the step of implementation (Stuart *et al.*, 2002). In this thesis, exploratory case studies are used for data gathering and concept development, and explanatory case studies for the validation of theories.

The Empirical Inquiry

Data Analysis Using Data Collection Tables

The contents of the table are designed according to the flow of the main elements – the requirements of continuity of the various activities in the company and the accompanying problems that are the basis for improving the overall performance of the company, as shown in Table (1):

Table 1: Accidents expected to occur in the company's operations and causes

Critical event and its impact	Type Environmental, Technical, Administrative	Site	the reasons	Expected costs
<u>Economic and Social:</u> 1. Destruction of farms. 2. Destruction of land and crops. 3. Loss of fish wealth. 4. Cut down trees and plant death. 5.Migration and displacement	Environmental, Technical, Administrative	1. West Qurna and the river Son of Omar. 2. Zubayr Farms.	1. Pipe and drilling of wells. 2. Limited safety procedures. 3. Establish stations. 4. Materials leaking from cans and obsolete containers. 5. Damage pipes because of water and the lack of sustainability teams' patrols and also acts of sabotage.	*Losses in oil productio n *Material losses *Human losses

			6. Radioactive materials, jet materials that are thrown on the ground and materials that come out of the bad packaging containers.	
Damage to air Damage caused by 1. Gases from explosion, holes, cleaning. 2. Combustion (diesel machines, turbines, gas). 3. Leakage of gases due to load operations, tanks, processing equipment.	Environmental, Technical	All work sites	1. gas leaking 2. damage to pipes and reservoirs. 3.limited capacity to detect leakage sites 4. Gases emitted from ignition priming. 5. Poor attention to maintenance procedures at specified sites.	*Material losses *Human losses *Financial losses
Water pollution: Pollution caused by: 1. Water from processing production. 2. Candidate fluids for drilling and chemical treatments. 3. Treated water and washing, and dirty water. 4. Health and sewage residues. 5. Leakage of reservoirs residues.	Environmental	Crossings for rivers like Tigris and Euphrates in Dhi Qar There are several pipelines that pass through the rivers and the river Alki in the northern Rumaila	1. Production and processing of crude oil. 2. Chemical and other mineral residues associated with the evaporation of water from oil wells. 3. Subtract water residues associated with production in the lakes.	Costs and losses are based on the level of damage

		and Rumaila South	4. Poor maintenance of reservoirs. 5. Lack of special places for landfills or disposal.	
Effect on the Earth: 1. Ground disturbance resulting from drilling. 2. Pollution resulting from solid waste disposal.	Environmental, Technical, Administrative	All oil extraction and production sites	1. The large number of materials extracted from the wells in the ground, causing various pollution cases. 2. Not to use the safety procedures. 3. Not subjecting the drilling to global standards. 4. The result of drilling oil wells and the injection of production residues into the ground. 5. Not to completely dispose of waste. 6. Weak drilling procedures and cleaning reservoirs and Insulators.	Significant financial losses
Physical Effects: Effects resulting from: 1.Electrical leakage, electric spark.	Environmental, Technical	All productivity sites, Makina site	1. Electrical leakage due to the inaccuracy in the connection and maintenance	Damage Human, physical, financial,

2. The different radiations. 3. The high variation in temperature 4. The Dust.		and Bab Al Zubair site	of electricity and lack of knowledge, and increase the capacity of inappropriate wires. 2. Radiation due to the extraction processes and remnants of war. 3. Plenty of dust. 4. Damage to air filters and generators. 5. The weakness of the role of the Department of Safety and Fire.	environm-ental and high financial costs
<u>Signals and semantics:</u> 1.Semantics : A - non-existent, B- unclear C - Inappropriate. 2.Signals : A - not present, B - unclear, C - Inappropriate.	Environmental, Technical, Administrative	All Productivity sites	1. Weak commitment to semantics and signals. 2. Lack of control to ensure that the semantics and signals remain in place.	costs High
<u>Potential contingencies :</u> Damage resulting from: 1. Leakage of fuel, gas, chemicals and risky materials. 2. Unplanned noise. 3. War, acts of vandalism, and natural disasters.	Technical, Administrative	*All stations *Gas isolation stations *Pressing stations Stores* *Main pipe	1. Lack of interest in fuel leakage. 2. Lack of early warning 3.Lack of shelters or measures to minimise damage.	costs High

			4. Weakness of specialised training in the areas of occupational safety.	
Impact on technical processes: Effects on... 1. Stress 2. Operating errors 3. Errors in supervision 4. Errors due to guidance.	Technical, Administrative	All company sites	1. Lack of safety and security measures. 2Operational errors	Financial costs and confusion at work
Administrative issues: Problems arising from: 1. Unclear instructions. .2 Errors in documentation 3. Limited support of the administration. .4. Lack of specialised training 5. Lack of clarity of powers and responsibilities. 6. Slowness and chaos in communications. 7. Not to use corrective and preventive measures. 8. Lack of a special database for the company.	Technical, Administrative	Administrative units at all the company's sites	1. Lack of understanding of the use of management technology (computer). 2. Weak documentation and preservation system. .Lack of database3. 4. Lack of an integrated job description. 5. Lack of documentation according to the quality system in all activities and work. 6. The absence of a specific system quality that is	Human, material, financial and environmental losses

			certified integrated and achieves results in the work. 7. Lack of evidence to guide the company in all its work.	
Any other critical events: Gas leakage in the atmosphere due to the burning of oil derivatives or exploration and establishment and rehabilitation of new wells.	Technical	All oil production sites.	Lack of technique to invest in natural gas.	High financial costs

Table (1) shows the critical incidents facing the company's operations and its various activities as follows:

1. The company is exposed to many and varied accidents, crystallised around three groups (environmental, technical and administrative), and may reflect these incidents (dangerous and expensive) negatively on the operations of the company and its activities.
2. The incidents were not determined in a particular location or area of specialisation, but were distributed on the company's various sites (technical and administrative) such as drilling sites, production, river crossings, and the company centre. The type of event (environmental, technical, administrative) depends on where it occurs.
3. The causes of the critical events are determined by leakage of gases due to pipe and reservoir damage, poor maintenance procedures, limited protection and safety of toxic waste sites, gases from mug wax, no suitable disposal toxic waste sites, damage to turbine units filters, poor attention to signals and semantics, weak methods of using modern technology, lack of standard procedures for administrative work, weakness in knowledge and practice of modern systems for document retention and retrieval.
4. The risks of these incidents are determined by the loss of living organisms, the death of the soil, the loss of human life, chronic diseases, and the waste of productive time, pollution

of various kinds, economic and social damage, as well as financial losses and lack of reputation in society.

Use of Model (FMEA) or Failure Model and Effects Analysis

The data were collected and the analysis procedures were adapted in the FMEA model according to the requirements of the production and processing system in the company in question. The data were reorganised according to what is agreed and the problems in the company sample of the study and on the basis of subsequent steps:

Table 2: Results of use of risk profile (precedence) and severity of risk effect (or degree of risk)

Risks	Intensity of occurrence 1-10	The emergence of risk 1-10	Risk Disclosure 1-10	Sequence of risk priorities *RPN	The value of the degree of risk RSV
Economic and Social	24	6	4	2	48
Damage to air	56	8	7	2	112
Water pollution	35	7	5	3	105
Effect on the Earth	48	8	6	3	144
Physical Effect	42	7	6	5	210
Signals and semantics	16	8	2	2	32
Potential contingencies	42	7	6	2	84
Impact on technical processes	40	2	5	3	120
Administrative issues	49	7	7	4	196
Any other critical events	30	6	5	3	90

RPN= Intensity of occurrence * the emergence of risk * Risk Disclosure*

RSV = Intensity of occurrence * the advent of risk

Table 3: Summary of risk probability (precedence) and severity of risk effect (or degree of risk)

Risks	Sequence of risk priorities Probability of emergence of risk RPN	The value of the degree of risk (risk level) RSV
Economic and Social	48 (The probability is relatively low)	
Damage to air	112(Probability of the middle, possible emergence)	
Water pollution	105(Probability of the middle, possible emergence)	
Effect on the Earth	144 Likely to Appear	
Physical Effect	210Very high probability	
Signals and semantics	32Rare Appearances	
Potential contingencies	84Relative or relatively weak probability	
Impact on technical processes	120Likely to Appear	
Administrative issues	196Very high probability	
Any other critical events	90Likely to Appear	

In the current situation, there are risks that have a clear impact on the overall performance of the operations. Therefore, these risks must be monitored and their relationship to the requirements of the continuity of production flows to avoid potential risks noted; this means that the problems and risks facing the company in all its activities were reflected in a weak form of efficiency requirements of the continuity of production flow, the result was a weakness in the overall performance of the company.

Discussion

The main objective of the study is to identify the role played by the interaction of the supply chain risk management strategy with the requirements of the continuity of the production process in enhancing the capacity of the production process to improve the overall performance of the operations system as the spirit of the industrial organisation. Design, operation and implementation of the production system: the production process interacts with the different functional areas of the manufacturing system and with the processing of the delivery of goods and services to the customers. The processing chain refers to the activities extending from the supplier to the customer to add value to the product or service (Russell & Taylor, 2011, 2014). Thus, there is an alternate dependence between the supply , production and overall performance of the industrial organisation, and despite the logical relationship between the

three components, they are often not complete in the content of any of the three components and the intrinsic and sequential relationship between them, which weakens the outcomes of the flow The process of production may be weak in the management of the supply chain, in the relationship between the requirements of the production process and supply chain performance, in the partial perspective of the supply chain rather than the strategic perspective, or focus on the general framework of the supply chain rather than on the reasons for the supply problem, and this confirms the central role of the supply system in influencing the production process. The risk management strategy of the supply chain means managing the supply process according to the needs and expectations of the customer by controlling the supply risk and effective demand management, which is supposed to achieve an effective and quick response to the requirements of the flow of the production process.

Conclusions and Future Work

Risk analysis can influence the supply chain. The consequences of each risk can vary from almost negligible risks which will not bring the relevant effects on the supply chain to catastrophic events that may cause catastrophic damage. Therefore, managers should try to measure and determine the potential cost (or gain) of each risk. This can be achieved by analysing the processes involved in each risk and assessing a possible range of hazard damage. There are many tools that may support companies in conducting risk analyses. The most widely used tools are FMEA.

,

The results of the analysis show that the various risks faced by the company's activities are reflected in a weak form of efficiency of the overall performance of the organisation due to weak response to the requirements of continuity of production flow.

The analysis of the results revealed the interrelationships and interdependence between the requirements of the continuity of the production flow and the strategy of managing the risks of the processing chain and the positive role of the interdependence between the processing strategy and the production process.

The results of the analysis also indicate an interactive relationship between the strategy of the management of the risks of processing and the requirements of the continuity of the flow of the production process. This interaction contributes to improving the overall performance of the operations. The reduction in the problems and risks of processing is reflected positively on the reduction in production problems and overall performance of operations.

Future Research

Future research should be oriented to use the other model, to find better answers on the current of supply chain risk management in this kind of company and present alternatives that help to improve decision making for operational and tactical organisational levels. We are looking for, without doubt, a reference point in reduction of the supply chain risk, in order to identify strengths and weaknesses to restructure roles and strategies with the purpose of improving the competitiveness of enterprises.

REFERENCES

Baskerville, R.L., (1997). "Distinguishing Action research from participative case studies". Journal of Systems and Information Technology, 1, 25-45.

Chopra, S. and Sodhi, M.S. (2004). Managing risk to avoid supply–chain breakdown, MIT Sloan Management Review, Vol. 46, No. 1, pp. 53–62.

Dani, S. , Zsidisin, G. A.; Ritchie, B (2009). "Predicting and managing supply chain risk", In (Ed.). Supply Chain Risk: A handbook of assessment management and performance. New York: Springer.

David, G. (2014)." supply Chain: Risk Management for Resilient Supply Chains, Business and Employment, Supply Chain Risks.

Donald, W. (2007). Supply chain risk management: Vulnerability and resilience in logistics", Logistics &Transport, second edition, ISB: 97807 49 448547, Page Limited: London.

Ellegaard, C. (2008). "Supply risk management in a small company perspective." Supply Chain Management, 13(6), 425-434.

Kapoor, V., & Ellinger, A. E. (2004). Transforming supply chain operations in response to economic reform: the case of a motorcycle manufacturer in India. Supply Chain Management: An International Journal, 9(1), 16-22.

Li, X., & Barnes, I. (2008). "Proactive supply risk management methods for building a robust supply selection process when sourcing from emerging markets". Strategic Outsourcing: An International Journal, 1(3), 108-115.

McCutcheon, D.M. & Meredith, J.R. (1993). "Conducting case study research in operations Management. Journal of Operations Management, 11, 239-256

Michael H. H. (2003). "Essentials of supply chain management", Johan Wiley and Sons, ISB No – 471 – 23517 – 2, New Jersey.

Paulsson, U. (2004)." Supply chain risk management", in: Brindley, C. (ed.), Supply Chain Risk, pp.79–96, Wiltshire, UK: Ashgate Publishing Limited, Ref. The Royal Society, 1992.

Porter A. (2009). "Operations Management,. Vent us publishing"APS, ISBN978-87-7681-464-9.

Pujawan, I.N. (2004)." Assessing supply chain flexibility: A conceptual framework and case study. International Journal of Integrated Supply Management, 1(1): 79-97.

Rachmat A. A. (2008)."implementation of risk management framework in supply chain: A tale from a biofuel company in Indonesia ".Manchester Business School Working Paper No 614

Ritchie, B. and C. "Brindley (2007)."Supply chain risk management and performance", International Journal of Operations and Production Management, 27(3), 303-322.

Russell R. S, & Taylor B.W; (2011). "Operations management: Creating value chain along supply chain. John wily & sons, INC.

Samuel C. O. (2004). "Improving modern san jose state university manufacturing systems. One Washington Square, San Jose, CA 95192-0061

Slack, N. Chambers, S. H. Christine, H. A., and Johnston R. (2004). Operation management", 4th ed, London PITMAN.

Sodhi, M., (2005). "Managing demand risk in tactical supply chain planning for a global consumer electronics company", Production and Operations Management, v. 14, n. 1. 104-105.

Speckman, R. E.; Davis, E* W[i], (2004)."Risky business: Expanding the discussion on risk and the extended enterprise", International Journal of Physical Distribution & Logistics Management, v. 34. n, 5. 111-115.

Stevenson, WJ. , (2002). "Operations management", 7th ed., McGraw-Hiil/lrwin. Stuart, I., D. McCutcheon, R. Handfield, R. McLachlin & D. Samson, 2002. "Effective Case research in operations management: a process perspective". Journal of Operations Management, 20, 419-433.

Suml, and Peter Meindl, (2001). "Chain management: Strategy, planning. and Operations Chopra", Upper Saddle River.

TANG, C. S, (2005)," Perspectives in supply chain risk management". International Journal of Production Economics, v, 103, 15, 117-121.

Thomas Scannell, Sime Curkovic, Bret Wagner, (2013),"Integration of ISO 31000:2009 and Supply Chain Risk Management American", Journal of Industrial and Business Management.

U. Juttner, H. Peck, M. Christopher, (2003. "Supply chain risk management: Outlining an agenda for future research" International Journal of Logistics: Research and Applications, Vol. 6, No. 4. 197-210 .

Voss, C., Tsikriktsis, N. and Frohlich, M. (2002). "Case research in operations Management", International Journal of Operations and Production Management, Vol. 22, No. 2, pp. 195–219.

Xuanguo X. Zhongmei L. and Wenmin, H. (2010). "Coordinating supply chain distribution in the presence of production disruption risks. International Journal of engineering Business Management,vol. 2,No.2. 114-121.

Yin, R.K. (2003)." Case study research, design and methods. 3rd ed., Sage Publications, Thousand Oaks, CA.

i