SUPPLY CHAIN-GEARING UP FOR THE FUTURE? PROGNOSIS BASED ON SCENARIO PLANNING

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ABSTRACT

This paper studies the risks and uncertainties surrounding global food supply chains and finds that "scenario planning" which is a popular tool used in other sectors for risk identification, is less widely used to identify risks within global food supply chains.
Presented in this paper is a review of available literature and a discussion with regards to the feasibility of using scenario planning to address food supply chain risks. The feasibility of using scenario planning at the strategic, tactical and operational level is also discussed.

Keywords: Supply chain Overlap,DES,Global Supply Chain,Scenario Analyser,Simulation.

INTRODUCTION:

Today's Corporate Environment is dependent on the efficacy of a supply chain.The underlying philosophy behind success is supply chain rivalry.The chain reaction between the members of a supply chain can improve the profitability of the chain.There is an overall impetus towards reducing costs while focusing on core competencies but all this is not possible without an effective and efficient supply chain.

The Logistics Council of Management defines Supply Chain as a process of managing the flow of raw-materials.in-process inventory and finished goods from point of origin to point of customer requirement.A company's supply chain is not only about logistics but also risk management attached with return of defective materials back to the Company.

Several business trends like outsourcing, globalization, shorter lead times and reliance on supply networks for competitive advantage contribute to create an increasingly risky environment (Zsidisin, 2003). Risk exists at various levels, inside the company and along the external processes (Borghesi and Gaudenzi, 2006). The aim of risk management is the protection of the business from adverse events and their effects. Risk was defined as a chance of danger, damage, loss, injury, or any other undesired consequences (Harland et alii, 2003). Both in the intra-organization perspective and particularly at a network level, risk management aims to protect the capability to achieve the main objectives, and for this reason the commitment amongst supply chain members in managing risks is essential (Jüttner et alii, 2003). Therefore, risk management is becoming a value-added, transversal process which protects the capability of the companies to achieve their objectives (Young and Tippins, 2002)

It is very difficult to predict the supply chains of the future independent of the World Future.Scenario planning on different possibilities will be necessary to analyse supply chain strategies and networks,evaluate the return from building more flexible supply chains and develop plans in advance for how the Supply Chain should reset depending on how things actually plans out.

The Top Ten events affecting Supply Chain:

1. A majority of companies have reconfigured their supply chain networks.Huge Impact on Product design,pricing logistics or Growth of Eastern Brand Owners.Eastern Customer becoming forefront of Operational Supply Chain planning.
2. Operational Supply chain planning and execution will start to blur.
3. Substantial drop in Overall inventory levels.
4. Web- based supply chain software to dominate the landscape.
5. Green driver transportation collaboration.
6. Visibility to everything all the time through RFID.
7. Supply Chain focus turns to emerging markets-product Design,logistics etc.
8. Common deployment of real-time part management thro Scoreboards and Dashboards on track to meet future objectives.Deviations need to be addressed before they become actuals and appear on the coreboard.
9. Digitisation increases impact on the Physical Supply Chain.eg.ITunes throwing CD makers,Watch ,mid-level camera makers.
10. Following the Leader-Apple and Cisco -forefront to 'Digitisation' of the Supply Chain.

In Apple ,once the design is implemented two organisations are held responsible.They are the Supply Chain and Engineering.The Apple New Product and Process development looks at mapping up of all stages and cross-functional development.There are two key attributes in Apple once design becomes the precursor ,they are the Engineering Integration Programs and Global Supply Management.The Engineering Program is all about

Integration from Operating Systems to materials which decides What a Product should be and controls each step without owning it.
The Global Supply management is all about Operations grouping to make it from Source,Procurement and Production.It is the least Cost effective way of Designing ,Building and Testing.The method is based on creating a series of 'different futures' generated from a combination of known factors, such as demographics, with plausible alternative political, economic, social, technical, legal and environmental (PESTLE) trends which are key driving forces. The goal is to craft diverging worlds by extrapolating these heavily-influencing driving forces. The technique can also include anticipatory thinking elements that are difficult to formalise, such as subjective interpretations of facts, shifts in values, new regulations or inventions.
It is a group process which encourages knowledge exchange and development of mutual deeper understanding of central issues important to the future of your organisation. Although the method is most widely used as a strategic management tool, it can also be used for enabling other types of group discussion about a common future.

SUPPLY CHAIN ISSUES AND CHALLENGES:

According to Bernie Hart, global product executive, logistics management, with financial services firm J.P. Morgan's Global Trade Services group, Hart lists the following nine trends that will characterize global supply chains throughout the year.

1. Supply chain risk mitigation in an economic downturn:
Supply chain risk mitigation will receive increased focus past downturns due to the following factors:
- supplier financial risk,
- volatility in energy, commodity, labor rates and currency exchange,
- unpredictable economic recoveries.

2. Searching for working capital
Buyers will need to extend payment terms,while suppliers will need to collect receivables more quickly,create the need for a liquidity buffer to mitigate their brewing payables/receivables conflict.

3. A resurgence in letters of credit
With credit getting tighter in all sectors, the supply of letters of credit have been declining while the cost has risen dramatically

4. Shortening the supply chain
Many plant operations and sourcing vendors closer to home and away from Asia.

5. Improved speed and savings in Mexico
A customs regime regulate logistics cost in terms of dollar per container and number of days will help attract additional products.

6. More free-trade agreements and more scrutiny
Many Countries are introducing control list or Catalogue of Commercial encryption products.This new list calls for higher regulatory oversight of firms that use encryption technology within their products..

7. A global eye toward consumer product safety
Similar regulation around the world that will address safety standards and requirements for Children's products, such as mandatory testing, the reduction in lead paint usage, and more visible cautionary statements related to choking hazards.Upon import, products must be accompanied by certification that they comply with all applicable consumer product safety rules.

8. **The domestic shipbuilding industry may be growing at eight per cent annually,** but it accounts for just one per cent of the global shipbuilding market.
China, South Korea and Japan are leading shipbuilding nations, accounting for over 80 per cent of the global shipbuilding industry, which is estimated at Rs 7.3 lakh crore. China alone accounts for over 35 per cent of the global market.

In order to put Indian shipbuilding on a faster track, industry bodies suggest bracketing the industry as a strategic one, besides reviving the subsidy scheme for shipbuilders and cutting the slack on certain tax regulations could be taken up for starters.

The fast food industry is witnessing a spurious growth in Venture capital and Private Equity.

The domestic sector will see a large influx of food suppliers and retail companies to about $750 million investment to stay competitive.

Most of the Venture capital,as the Experts agree will be towards supply chain management and cold-chain storage infrastructure.Around 22% of the total investments will be towards front-end retail in FMCG,food and beverage firms while the back-end will garner a lump 1%..

So, a three- to seven-year long investment is bound to reap two-and-a-half times increase in returns.

The supply chain retail segment has long been neglected due to the focus on IT and e-commerce firms.

($ mn)

Top deals in FMCG, Food & Beverages

Investor	Investee	Value
Temasek	Godrej Consumer Products Ltd	137
Kohlberg Kravis Roberts & Co	Coffee Day Holding Co (Amalgamated Bean Coffee Trading Co)	75
New Silk Route	Coffee Day Holding Co (Amalgamated Bean Coffee Trading Co)	75
Standard Chartered PE	Coffee Day Holding Co (Amalgamated Bean Coffee Trading Co)	50
Indivision India Partners	Blue Foods Pvt Ltd	33.33
Sequoia Capital	Prakash Snacks	30
Reliance Equity Advisors	VVF Ltd	29.57
Darby's Asia Mezzanine Fund II	Amalgamated Bean Coffee Trading Co	25
Standard Chartered PE	Bush Foods Overseas	25
Motilal Oswal VC Advisors P Ltd	Parag Milk Foods Pvt Ltd	15
Peepul Capital	Sresta Natural Bioproducts Ltd	15
International Finance Corp	Dunar Foods	14.8
Sequoia Capital India	Stovekraft Pvt Ltd	10.64
TVS Shriram Growth Fund	Om Pizzas & Eats Pvt Ltd	10.64

(Source: Grant Thornton)

PURPOSE:

The Supply Chain risk management concept comes from a variety of applications. So there is bound to be differences of opinion regarding the best research methodologies at each stage.

It is time now to fine tune the Supply Chain risk management literature based on industry needs and bring a unison in the methods among researchers.One of the adequate steps in this area is the role of SCENARIOS and step towards its planning.

Scenario planning was described by Ringland as a set of processes for improving the quality of educated guesses and also for deciding what their implications are (Ringland, Schwartz 2006). Scenarios were defined by Kahn and Weiner (1967) as "hypothetical sequences of events constructed for the purpose of focussing attention on the causal processes and decision points". Another more recent definition follows (Ringland, Schwartz 2006) "builds plausible views of different possible futures for an organisation based on groups of key environmental influences and drivers of change about which there is a high level of uncertainty" Gerry Johnson and Kevan Scholes (1999). A crucial point noted by many academics is that scenarios are not predictions for the future but rather plausible futures none of which may actually materialise (Wack 1985, Wright 2000). Its purpose is more to make managers more aware of how prepared they are about plausible futures and how these scenarios can assist in making sound management decisions resulting in better and more effective choices (Ringland, Schwartz 2006, Wack 1985). Scenario planning has now being adopted as a

planning tool across many organisations but there remains ambiguity regarding the exact procedure and other variables like number of scenarios needed ,number and type of people involved etc. as there is no standard approach towards implementing it.

The tools of Scenario planning in Supply Chain augurs certain next generation challenges like:

1. Cost effective Green Supply Chain
2. New Management Models
3. Demand Management and Mass Customisation
4. New Technology and ICT
5. Managing Supply Chain uncertainty and Customer Responsiveness
6. Configuring the right logistics network ,engaging the right alliances and Partnerships by selecting appropriate Production,Inventory and Distribution Strategies.

Digital economy and IT in the form of E-Supply chain solutions –Compressing cycle time ,lowering inventories,decision-making ,quality,reduced overhead costs.

The purpose of this paper is to illustrate how a discrete-event simulation may be used to provide solutions for the flexible supply chain problems of timing and selection, using a real life example. In this paper, the usefulness of the DSS is not for daily changes, but for periodic changes in the supply chain design due to fundamental shifts in the system. Which can be tackled by Scenario Planning Examples include new product introductions, new technology in production, a changing customer base due to winning a long term contract, political changes, new laws, and so on. Consequently, the DES model is not run everyday to decide that day's (or near future) operations. Rather, it is used to modify the source of supply, change the transit mode, negotiate rates with carriers, investigate using 3PL's for consolidation of product, etc. Although not run on a daily basis, when the need does arise, an analysis is needed promptly. Without a living model, companies typically use large amounts of human effort to fight these fires. Consequently, the DSS-based analysis' value is equally as attributable to its promptness as to its quality.

LITERATURE REVIEW:

DES have long been a useful methodology of Operations Research which is used to evaluate the interdependencies among the suppliers and Customers (Law and Kelton, 2000; Pritsker, 1995; Winston, 2000) causing failures in the performance characteristics of the system.

As such, DES has been used to study flexibility in manufacturing systems (Albino et al., 1999; Caprihan, 1997; Gupta et al., 1992; Garg et al., 2001; Borenstein, 2000; Pflughoeft, 1999; Nandkeolyar et al., 1992). However, simulation is primarily used to demonstrate flexibility of a design parameter, i.e. routings, polices, and equipment design. These types of simulation models are termed "throw away models" because they are seldom used after designs are finalized (Thompson, 1994). The simulation itself was not the vehicle of flexibility, which is the thesis of this paper. That is, flexibility in supply chain management is achieved through building a decision support process around a simulation model.

Simulations in DES provide understanding of complex supply chain problems for continuous application (An et al., 1994; Ferguson, 1998; Chen, 1999).

Similarly with manufacturing simulations, supply chain simulations are also primarily of the throw away type and only provide a point solution. In contrast, DES may also serve as a basis for a DSS process. However, a debate has arisen on whether supply chain simulation models are adequate for the basis of decision support systems. Shapiro (2000) cites two "serious deficiencies": The first is the time and effort required. The second is a simulation model fails to provide insights into how a system can be optimized. Neither deficiency is insurmountable, however.

Companies requiring the development and use of complex supply chain simulation models may derive greater efficiencies and use of resources through outsourcing the task to experts as actualized in the example presented in this paper. As for the second deficiency, optimization techniques are inadequate for describing or solving many systems. For those cases, experimentation with simulation is a worthy alternative because the strength of simulations is in their ability to model almost any system, regardless of its complexity. Additionally, in practice, expertise of optimization problems is even more difficult to find than expertise of simulation as the mechanics of simulation models are easier than optimization models to understand because of the animation and modeling constructs that simulation provides. Companies needing analysis have more options with simulation. Finally, the application of operations research within an organization is evolutionary. Companies at the initial stages of evolution should begin with less complex solutions, rather than jumping to the most advanced solutions. Otherwise, failure is likely, and operations research is cast aside.

A current trend of using simulation as an instrument of flexibility is real-time simulation (Wu and Wysk, 1989; Erickson et al., 1987; Harmonosky and Barrick, 1988; Harmonosky, 1990; Cho and Wysk, 1993; Smith et al.

1994; Jones et al., 1995; Peters et al., 1995). Real-time simulation is the use of simulation technology for real-time operational control within manufacturing systems. Real-time simulation emulates the control logic and mimics the behavior of the manufacturing system for short periods of time. Its objective is to provide advanced planning and scheduling capability to aid in capacity planning, sequencing, predicting leadtimes and duedate quoting. Simply put, real-time simulation is a DSS process used on a daily basis with the level of detail is at the shop floor. Users are within the walls of the plant and less emphasis is on representing the stochastic nature of the system. In contrast, the use of simulation as a process is expected to be monthly/quarterly. If daily use of the model was expected, then the academic/ industry partnership would be of little value. Also, the stochastic nature of the system does play a role in the analysis, specifically in demand orders and transit times. Considering the previous use of these real-time simulations in daily operations, the potential benefits of using simulation in a SCM DSS system to facilitate order and transit time flexibility holds promise.

The next section provides an example of how a DES is used to create greater flexibility in the supply chain management of a major firm. The importance of this research has several facets. First, it demonstrates the continuing use of simulation to study supply chain issues, specifically in APAC. second, it demonstrates that simulation can be the basis of a DSS process instead of a "throw-away" model. Finally, it demonstrates that OR can be structurally organized by using an academic/industry partnership that improves the viability of the process The DSS for Domestic Source of Supply Material Row to APAC

PROBLEM DESCRIPTION:

The company used in this example is a multi-billion dollar technology-based company with over half its sales derived from outside the United States, predominately in the Asia-Pacific (APAC) region. Known as a company of new products, the diversified product line gives the company the ability to meet its customers where they are, whether the customer is in a developing country or a state-of-the-art technological one. However, for this company sources of supply are constantly in a state of fluctuation and its APAC customers experience spiky, highly-variable demand growth patterns. Expansion, socio-economic conditions, and politics make it difficult to forecast consumer demand. Additionally, as a world-wide company, domestic and international supply chains often overlap to take advantage of scale. When redesigning one, it impacts the other. This dependency and cascading effect makes tracking difficult. Finally, the impacts of supply chain design on the performance values of cycle time, throughput, and WIP inventory are difficult to calculate for non-existing systems. Variability and interactions significantly impact these values. Consequently, effective APAC supply chain management offers immense potential savings in improved inventory management.

Not surprisingly, the company's international logistics management group is full of experienced professionals quite knowledgeable of the mechanics of establishing and maintaining operations outside the US. Measurement and incremental improvements in efficiency of existing systems is not the challenge. Rather, investigating new options due to fundamental changes both in supply and demand are the challenge. To meet the challenge, a partnership with academia was formed to create a decision support system (DSS) using discrete-event simulation (DES) that would add flexibility when operating and designing its supply chains in Asia-Pacific (APAC) operations. As a bonus, the DBS-based DSS would improve productivity and free people to perform tasks where creativity is needed.

The system to be modeled is the company's current flow of material from US-based sources of supply (SOS) to APAC. From all parts of the US, more than twenty-five SOS export over 100 million tons of products annually to APAC customers in 20+ countries. The primary SCM decision at hand is whether to ship directly from a SOS to an APAC customer or to ship through a US-based consolidation point in an attempt to reduce transit costs by achieving economical load factors (Figure 1). Provided a full load is ready, shipping directly is always the preferred route both in terms of cost and transit time. However, if not enough orders have generated a full load, the company will ship the current orders to a consolidation point. Since other SOS are doing the same, an APAC customer-specific full load is generated at the US-based consolidation point.

The decision to ship directly or through a consolidation point is complex for several reasons:

1. **The consequence of waiting for a full load**: Although shipping directly is always the cheapest and fastest, waiting for a full load before shipping increases cycle time and WIP levels.
2. **Demand variabilit**y: For many reasons, APAC customers generate orders at different volumes and with different degrees of variability, which may substantially increase wait time.
3. **Product characteristic**: The definition of a 'full-load' is unique due to the many different products the company produces. Some loads 'cube-out' before 'weighing-out' if the product is relatively light.
4. **Delivery time components**: Delivery times are affected not only of by transit time, but also by carrier/lane availability and border-crossing times. Some APAC countries are trade friendly while others are not.

5. **Overlapping supply chains:** Although shipping direct is beneficial, shipping through the US-based consolidation point has the advantage of overlapping US/Out of US supply chains because the consolidation point is also a consolidation point for domestic and non-APAC Out of US customers. Therefore, full loads from the SOS to the consolidation point occur often.

Aside from these complexities, the following are questions that the DES logic system must address:

1. Using the existing network, how long should a US-based SOS wait for a full load (versus shipping through the consolidation point)?
2. Should an APAC-based consolidation point exist? If so, where? and with what impact on the domestic supply chain?
3. Can the critical components of the supply chain be determined and used to negotiate with carriers/ logistics companies to minimize shipping costs?

Each of these questions may be answered through a simulation model that allows flexibility when conditions change, despite the complex variables required in the supply chain decisions presented here. specifics of the model developed and the software used are discussed next.

MODELING ISSUES:

Discrete-event simulation was the technique used to model the flexible supply chain timing and load decisions. Software used to create the DES was SimulS. SimulS is a low-priced ($1,000) DES package that offers considerable capability and ease-of-use. Its programming language, Visual Logic (VL), and global variable spreadsheets are invaluable when modeling supply chains.

Initialization Logic Using SmulS's Visual Logic and Global Variable Spreadsheets

For DBS-models to become part of a process, data must be clearly separate from the model logic. Otherwise, subsequent analyses require modeling changes instead of only data changes. The more effort put in designing the separation of data and model, the more likely the model will be appropriately specified and suitable for use in subsequent analysis. In this project, all modeling parameter values were read from a MS-Excel data file. The company generated the MS-Excel file from database systems. When designing the data file, non-existing network possibilities were included to generalize the model. For example, some APAC customers had no history of ordering from some SOS. However, that possibility (and dummy values) was still modeled to (1) provide future possibilities and (2) allow the use of looping logic when initializing the model.

The software's internal programming language resembles many other application-level languages and provides complex logic and general extensibility. In this model, VL was used for initializing the system of work center parameters (Note: a work center is a SimulS construct that performs work on an entity). For example, the definition of a full load was unique and SOS-customer specific. That is, each SOS-customer combination had uniquely defined full loads. By using clever naming conventions of the modeling work centers and using VL looping logic, work center full load values were initialized for each combination. Without this capability, a work center representing each combination would have to be modified manually, likely 200+ potential modifications.

Model parameter data inputted from MS-Excel was imported to global variable arrays defined as 'Information Store Spreadsheets' in SimulS. These spreadsheets can be readily accessed using looping logic and/or indices using VL. Within the model, each day's new orders attributes are assigned by using the spreadsheet and VL looping logic.

VALIDATION:

Validating the model required reproducing the previous year's actual system performance measures in terms of volume (lbs) and shipments (count). Each location (SOS, consolidation point, and APAC customer) was compared by running actual shipment history through the model. Student t-tests for each location's volume and count showed the model statistically represented the actual system. Once validated, the historical shipments were fit to probability distributions. Many were classically Poisson; however, some of the low volume SOS-customer combinations were fit with empirical discrete probability distributions. A warm-up period of three months (ninety days) was used and adequately provided a stabilized time-in-system (Figure 2).

A SAMPLE ANALYSIS : DETERMINING OPTIMAL WAIT TIME FOR DIRECT SHIPMENTS:

The initial analysis quantified the effect of waiting for a full load on cycle time and WIP. As mentioned, fully loaded, direct shipments between a US-based SOS and an APAC customer were always the fastest and cheapest. Also, full loads have the benefit of reducing the number of shipped containers through the

consolidation location. However, waiting for a full-load does add WIP to the system and increases cycle time. Prior to the analysis, the assumed cost tradeoff was shipping costs versus inventory costs.

Figures 3 and 4 show the results. In all charts, the horizontal axis is the "Maximum Days Waiting for a Full Load". For all SOS/customer combinations, an across-the-board value was chosen for the first ten runs. In the last run, an intelligent policy was used that was specific to each SOS/Customer combination. In the policy, reasonable (50% chance) time-to-generate-a-full-load estimates were calculated using a Normal approximation of the Poisson demands. Provided these demand estimates were less than a week, direct shipping was given an opportunity. If the estimates were longer, no direct shipping was used, and the SOS shipped immediately to the consolidation location.

For the first ten runs, Figure 3 shows that WIP increased as SOS waited for a full loadmaterial waiting on a dock adds both time and inventory to the system. However, the expected benefit was assumed to be fewer shipments. Figure 4 shows a reduction in shipments from the consolidation location to APAC customers; however, direct shipments increased. From history and the model, direct shipping loading efficiencies are slightly less than through consolidation. As direct volume increases, direct container counts increase faster than consolidated container counts decrease. Consequently, total shipments gradually increase, and no advantage exists for waiting for a full load.

Using a WIP cost of $1/1b, for a 100 million pound volume, the annual WIP savings equals $273,973.

Figure 4 shows the Smart policy reduced the annual container shipments to 4,600 from the Four-Day Max Wait policy of 5,000, a reduction of 400 containers. Assuming the cost to ship a container is $500, and that the cost of shipping is only a function of the number of containers, irrespective of the loading efficiency, the annual shipping cost savings realized in this example would be $200,000. With both WIP levels and total shipments reduced in this example, the total annual cost savings is $473,973. Although consolidated shipments increased, the impact of double handling was more than offset by the reduction in the total containers shipped .and the reduction in waiting for a full load time.

PROJECT/PROCESS MANAGEMENT:

The DSS was developed in three months. This included an initial meeting, model building, validation, and an initial analysis. During the initial meeting, the process objective was established and emphasized the development of a long-term methodology for addressing SCM questions rather than on answering a specific problem. The long-term approach minimized having to rush to provide an answer often seen in simulation projects. secondly, a long-term outlook ensured that cost savings and beneficial results did not have to occur on the initial analysis. Simulation answers often are similar to intuition/guesses. In these instances, the simulation model has little effect on the cost savings. Short-term thinking may conclude that simulation should be abandoned. However, a situation will eventually arise where the model offers a counter-intuitive solution. A long- term outlook ensures these results can occur.

Additionally, the benefit of simulation (and operations research methodology in general) is often seen in increased productivity. Provided enough people and resources are available, most SCM problems can be reasonably solved. Unfortunately, this fire-fighting methodology requires having enough people to attack the problem on an as-needed basis. With corporate down-sizing, firefighting is not a reasonable approach. An operations research-based DSS replaces people effort; thus, productivity is increased. For this DSS, a second analysis was requested six weeks after the initial analysis. The initial analysis was produced in three-months, and the subsequent analysis took three days because of the establishment of the process.

RESEARCH METHODOLOGY:

A survey was conducted in an effort to explore further the understanding and perceptions that entities within the UK food supply chains have regarding supply chain risks and the techniques deployed to mitigate and manage risks and disruptions (Dani and Deep, 2009). 31

The study was conducted with the help of a confectionary and snack manufacturer. The respondents from the food manufacturer agreed to send the questionnaire to some of the companies within its supply chain. This consisted of upstream suppliers of raw/ finished food products to downstream distribution and logistics providers (including packers). Eight

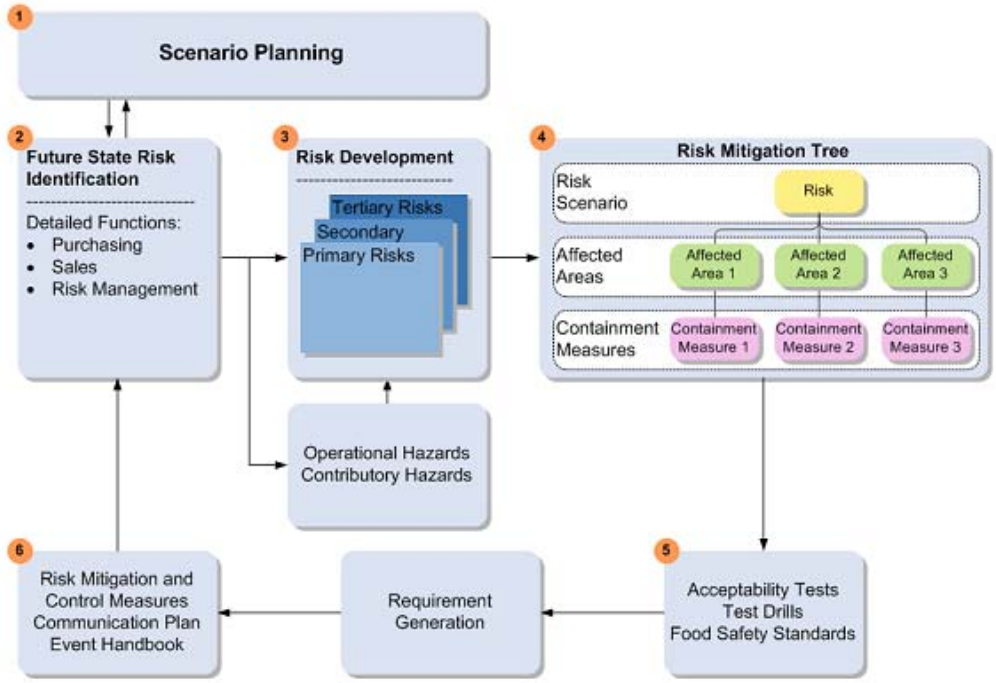
companies in total responded to the questionnaire which was deployed electronically using the ‘surveymonkey’ website and the question building toolkit. Twenty-eight respondents from the eight companies attempted the questionnaire, of which only fourteen filled it in completely, giving a survey return rate of 50%. Eight respondents from the fourteen were

then interviewed for further insight into the risk management process.

RESULTS OF THE SURVEY:

Based on the Survey carried out in the U.K.,India,China ,Thailand in 2009-2010 on how to design the next-generation supply chain based on Scenario planning,The following factors were listed as key issues-Stock Availability,Delivery Frequency,Order to Delivery Lead Time,Time Delivery slot and Supply chain inventory.

SCENARIO PLANNING: STRATEGIC, TACTICAL OR OPERATIONAL?



Scenario planning has traditionally been used for long horizons and as a strategic planning tool primarily amongst large US organisations (Linneman, Klein 1983) and western European organisations (Malaska 1985) and is witnessing a revival in popularity. In a recent survey of UK organisation it was reported that over a third use scenario planning in their strategy workshops (Hodgkinson, Wright 2006). However, more recently there has been a change in the perception of limiting it to long horizons and the interval between its reviews. Healey and Hodgkinson (2008) in their critique of the scenario planning process identifies a potential way to reduce anchoring effects of long term scenarios is to regularly analyse multiple scenarios in a fast and simple manner as opposed to the traditional elaborate and infrequent practice. In a recent paper by Marren (Marren, Kennedy Jr 2010), it is argued that given the increasing level of uncertainty, companies are forced to make critical short term tactical decisions and therefore there is no reason why the scenario approach must be restricted to extremely long timelines. This research aims at combining the strategic scenario planning exercise with scenario based tools at tactical and operational levels with inbuilt feedback and communication processes.

SKILLS AND COMPETENCIES REQUIRED BY PROFESSIONALS FOR SCENARIO PLANNING:

Earlier the Supply chain leader in most Companies relied on technical proficiency in shipping routes,warehousing equipment and distribution center locations and footprints.Today the need goes beyond Functional Expertise.Now the supply chain extends end-to-end within the firm and outside it including relationship with suppliers and Customers on a global basis.The shift of role of the Supply chain executive from a functional focus to process focus.

Selecting the right people to oversee the pivotal supply chain responsibility;these characteristics can be grouped into five key qualities:Global Orientation,Systems thinking,Inspiring and Influential leadership,Technical savvy and superior business skills.

These scenarios consider a wide range of business parameters such as customer satisfaction, on-time delivery and capacity utilization to support alignment with long-term corporate goals. The solution facilitates analysis between diferent alternatives to mitigate the risk of surprises and drive optimal decisions while eliminating the

need for repeated, extensive and interactive data edits and planning runs. With a Scenario Analyser a Company will be able to :

1. Create and manage multiple scenarios, reducing guesswork and improving planner productivity
2. Simplify an otherwise complicated IT process to store and manage multiple scenarios
3. Conduct plan-to-plan comparisons of both the input and output plan data from the planning engine, driving speed and
4. efficiency into processes such as capacity planning and sales and operations planning (S&OP)

The tsunami in Japan gave supply chain managers some valuable lessons.
Kelly maintains that the cost of being unprepared for potential supply chain disruptions can be paralyzing.
The most vulnerable companies are those heavily reliant on lean logistics and JIT distribution model.
There is a need for careful evaluation of compliance documentation and risk-related metrics and quantity to prioritise risk by measuring the likelihood or impact of an event.An ability to visualize risk and plan accordingly.
A scenario planning was carried out in the U.K.,India,China,Thailand in 2009-2010.Stock availability,Delivery Frequency were the key issues discussed.

DISCUSSION:

The study highlighted that '*Loss of reputation'* – primarily due to food contamination is the risk that is rated as 'high' and thus needs better 'strategic risk management techniques' to control and mitigate. As shown from this analysis, it is important to note that entities in the supply chain are focusing on operational techniques for risk management, but are paying less attention to 'strategic techniques' which may be needed in the longer term to make risk management a more proactive approach. The respondents also mentioned that the approach towards risk management was more reactive than proactive. Also, risk mitigation is highly dependent on experienced staff leading to knowledge management issues. The strategic risk management processes were conducted every 2-3 years and there was little collaboration with suppliers and hauliers towards risk management. These were important insights which raised a question whether "Scenario Planning should be restricted to a strategic level or brought down to a more operational level?"

NEED FOR A REVERSE ENGINEERING IN A SUPPLY CHAIN:

The primary importance of reverse engineering in Supply chain cannot be further emphasised by reusability of products and components.Setting up a reverse supply chain reduces the volume of destroyed products.
Retailers need to take up the challenge posted by such 'reverse supply chains ' when return policies become lenient.
The necessity to introduce new product freshness requires regular revamping of supply chain distribution channels and setting up reverse supply chains due to environmental constraints.Regulatory statutes regarding recycling have become an integral part of record keeping and product manufacture.The impetus is towards recycling every item for the equivalent item spent as a part of the Manufacturing process.

CONCLUSION:

The paper presents a study which considers scenario planning as an important process in supply chain risk management. The initial qualitative process has provided insights into the lack of strategic risk planning and the time lag in between scenario planning and risk management. The paper has proposed a scenario planning approach which brings the scenario planning process on an operational level. The framework highlighting the three levels of scenario planning has been tested positively on a limited basis in industry.

Companies that rely on a Scenario Analyzer can reap signifcant benefts, including:

- Improved long-term strategic and short-term tactical decision making
- Enhanced understanding of supply chain impacts stemming from short-term decisions regarding demand, capacity and material supply changes
- Increased revenue and margins stemming from optimal long-term decisions regarding capacity additions, growth scenario management and product mix alterations.

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