

**A conceptual Project Based Report on “Creating Resiliency in Supply Chain Management”**

**School of Logistics and Aviation Management**

**Bachelor in Business Administration  
(Logistics & Supply chain Management)**

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## Certificate of Approval

The following Conceptual Project Based Report titled "**Resilient Supply Chain Design in Consumer Goods**" is hereby approved as a certified study in Supply Chain Management carried out and presented by **Lalit Mohan Upreti** in a manner satisfactory to warrant its acceptance as a prerequisite for the award of **Bachelor of Business Administration in Logistics & Supply chain Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the Conceptual Project Report only for the purpose it is submitted to the Conceptual Project Report Examination Committee of the Galgotias University for evaluation of Conceptual Project.

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## Creating Resilient Supply Chain

### Abstract:

Due to Technological dependency, we love to watch movies online, we love to order food online, we love to shop online, etc. The point I am trying to make here is that we like to reap the benefits of all these services by sitting in the comfort of our house using just a click on our smartphones or other electronic devices. Did you ever think, 10 years back, that this would become the new normal? Trust me, No one would have thought about it, but we all know that we live in a V.U.C.A world, where the future is filled with Volatility, Uncertainty, Complexity, and Ambiguity, and its perfect example is COVID-19. As we all know that how this digital era has risen due to industry 4.0 which was introduced to us back in 2016 and this has created a shift from analogue to digital but still digital empowerment was lacking before COVID-19. However, the post COVID era has provided us the platform which acts as a building block in transitioning from Digital Inclusion to Digital Empowerment. This also tested how resilient the businesses currently are. Here, my focus is to talk about how one can create resilient supply chain designs for various businesses in this current era. In today's world Supply Chain Disruptions due to various risk elements are the most

common reasons for vulnerabilities in Supply Chains which are faced by almost every organization due to their global connectedness. Various research reports are focusing on these disruptions and risk elements but not exploring various criteria's like why every supply chain needs different risk mitigation techniques and how one can choose the best methodology to convert their supply chains to robust and resilient ones. In this conceptually based research report, I would be focusing on various unexplored questions associated with the Resilient Supply Chains, like why one supply chain is more critical in terms of risks than others and why is it important for us to re-design our supply chain differently based on different verticals. According to the status quo, risks are like deaths, they will come in various forms and mostly are inevitable, but we can mitigate their effects, for resilience in verticals. This paper totally focuses on how we can create any supply chain into resilient one by using step by step approach. I have also thrown light that we can combine various Industry 4.0 elements with the best-chosen methodologies, as to make our Supply Chains more & more resilient. This conceptual report is totally based upon concepts and is not meant to be exhaustive at all.

*Keywords: Supply Chain Risks & Disruptions, Industry 4.0, Resilient Supply Chain*

**Objectives: -**

- This paper is intended to find out that how and why different verticals need different Supply Chain Designs and how we can and must create different Supply Chain Resilient Designs for them.
- It also highlights basic step by step methodologies through which one can design any Supply Chain as a resilient one.



## Literature Review

There are various literatures given by various scholars, Let's talk about them one by one –

- 1) BUILDING THE RESILIENT SUPPLY CHAIN by Martin Christopher and Helen Peck Cranfield School of Management, International Journal of Logistics Management, Vol. 15, No. 2, pp1-13, 2004,

Their research has highlighted the risks to business continuity that lie in the wider supply chain. The trends towards the creation of increasingly complex networks of inter-dependent organizations – through strategies of out-sourcing and globalization in particular – have heightened some of these risks. It has become apparent that many organizations have not fully recognized the nature of systemic supply chain risk and have continued to focus on seeking efficiency improvements through 'lean' solutions. We have argued that a new priority has emerged for business planning. This priority has to be the search for supply chain strategies that embody a significantly higher degree of resilience. Resilience implies flexibility and agility. Its implications extend beyond process redesign to fundamental decisions on sourcing and the establishment of more collaborative supply chain relationships based on far greater transparency of information. These are major challenges to business leaders in every industry which urgently require attention.

- 2) CREATING MORE RESELIENT SUPPLY CHAINS by María Jesús Saenz and Elena Revilla, MIT Slogan Management Review, June 2014,

They talked about Global Supply chain disruption that how companies are globally connected and due to this they are facing various disruptions, they also gave an example about Cisco, that how a company (Cisco) who was reactive about the risk management became proactive by following various strategies and various changes in their culture. They stated various events from 2005 Katrina Hurricane in North America to 2011 Japanese Tsunami, and

how Cisco was able to defer these events and how they learn to make their supply chain more and more resilient by understanding and planning for these risks.

- 3) CREATING SUPPLY CHAIN RESELIENCE THROUGH AGILE SIX SIGMA by Professor Martin Christopher & Christine Rutherford, June – August, 2004,

Today's global supply chains are, in effect, highly complex networks. They are increasingly vulnerable to disruption which can have significant impact on profitability and shareholder value. Recent research at Cranfield School of Management has highlighted where the sources of risk in supply chains might lie and how that risk might be mitigated and managed by the application of 'Six Sigma' philosophies and procedures. They talked that how agile is better than lean six sigma approach in creating supply chain resilience through various tools.

- 4) THE ROLE OF COLLABORATION IN SUPPLY CHAIN RESILIENCE by Kirstin Scholten and Sanne Schilder, 8 June 2015, ISSN: 1359-8546

Their Research reflected that how collaboration influences supply chain resilience. Collaborative activities and their underlying mechanisms in relation to visibility, velocity and flexibility are investigated.

Key findings show how specific collaborative activities (information-sharing, collaborative communication, mutually created knowledge and joint relationship efforts) increase supply chain resilience via increased visibility, velocity and flexibility. Underlying mechanisms and interdependencies of these factors within the supply chain network are identified.

- 5) ACHIEVING SUPPLY CHAIN RESELIENCE: THE ROLE OF PROCUREMENT by Carla Roberta Pereira, Martin Christopher, Andrea Lago Da Silva, 2 September 2014,

They worked on understanding the role of procurement in identifying and managing the intra- and inter-organizational issues which impact supply chain resilience. Achieving resilience along the supply chain in today's turbulent business environment requires efforts from both internal and external elements of the extended enterprise.

The study revealed that procurement activities do make a significant contribution to creating supply chain resilience. Emerging from the literature review, certain intra- and inter-organizational issues were identified that could impact supply chain resilience. Also, the possible actions that

procurement could take to enable the enhancement of supply chain resilience were identified.

All these above stated Research Reports are mainly done as a part of Exploratory research as still today there are various undiscovered things related to make resiliency in a supply chain. As according to a study by MIT researchers, in an organization around 50-60% of managers don't know about risk management principles and amongst the rest 40% who know about the risk elements or management techniques, most of them are unaware of the framework to implement these techniques. So, in our report we would primary be focusing on a very simple matrix of supply chain ecosystem to identify various risk elements in different verticals carrying different supply chains, this will help us to know that for every supply chain there is different risk management process in accordance to different verticals. This supply chain ecosystem will help to map our supply chain so that one can easily identify the risk factors and reduce vulnerability and also use various tools and techniques to make supply chain more resilient and effective.

### **Background/Introduction –**

Before creating Resilient Supply Chains. Let's first understand some key elements which are very much important in creating resilient Supply Chain Designs.

### **Supply Chain**

The first basic element is supply chain. What is Supply chain? Before answering this question let me take to Stone Age, where humans used to hunt animals for their hunger, they usually used to plan their hunt, source various weapons from each

other, implement the hunting, making or cooking those raw meats in fire and also sometimes used to store for their future needs. This whole process was integrated via various networks of activities and this network integration is nothing but a Supply Chain. As, Supply Chain concept is really new concept but unknowingly people were applying it since past dawn of time. So, what supply chain basically means, in simple words supply chain means the network of individual activities used to integrate together as to convert raw materials to final goods and also move these finished goods to end customer. e.g. :- As tomato sauce being a final product, which comes from tomatoes which are grown by farmers and after harvesting these tomatoes, farmers sell them to various food processing companies directly or indirectly via third party and the food processing companies convert these tomatoes to tomato sauces which are further being sent to various distribution centers, these distributors send them to various retailers and consumers purchase them via various retail stores or through various other mediums. Here all the parties from raw material providers to end consumers are connected via various networks of logistics, information and finance. These networks are known as Supply Chains.

### **Supply Chain Management**

So, now the question comes in our mind is if this is supply chain then what Supply Chain Management is. Supply Chain Management is made up of two words – ‘Supply

Chain' and 'Management'. In simple layman language one can say that planning, organizing, coordinating and controlling of all the activities from sourcing, conversion and delivery of a product from its initial form to final form to an end consumer.

### **Industry 4.0 & Supply Chain 4.0**

Now if we talk about today's scenario, the supply chains are mostly global supply chains which are heavily working under influence of Industry 4.0 and these global supply chains are sometimes called under the name of Supply Chain 4.0 . So now the question is what Supply Chain 4.0 is and why nowadays everyone prefers it. Supply Chain 4.0 is the re-organization of supply chains – design and planning, production, distribution, consumption, and reverse logistics – using technologies that are known as “Industry 4.0”. These technologies, which emerged in the 21st century like – Artificial Intelligence, Supply Chain Visibility, IoT (Internet of Things), Digital Twinning, Stereo lithography and many more.

### **Conversion of Traditional to Digital SC**

Earlier when globalization and privatization were not very much famous and popular but industrialization was there, at that moment companies used to go for various activities like sourcing, making, delivering their products across a particular

area/region or nation, mostly by their own. Henry Ford in 1913, started his own chain of supplies where he used to own iron ores, production facilities, manufacturing plant at Michigan and his own distribution centers, Ford used to do everything by its own. But, as the LPG (Liberalization, Privatization, and Globalization) started, companies came to know about various countries and various limited resource constraints according to area wise, like – countries where labors are cheap, countries with more natural resources. This also gave rise to very famous model of – “Value Chain Analysis”, given by Michael Porter in 1985. Using this model companies started to do value analysis of their and competitors business models and came to know that there are various activities which they should not be doing as these activities don't create value or maximizing their values. So, they decided to outsource these activities to some other person. As third industrial revolution embarks the journey of internet and also IT sector started to boom, this created more connectedness across the globe. So, companies came to know about various countries in terms of labor, supplying power, manufacturing capacity and capabilities. So, they decided to integrate with them as to reduce costs and increase efficiency, e.g.: - Earlier IBM used to all activities from supplying to distributing, like - produce chips, assemble various components, distribute them after assembling. But now IBM only provides services, as it is their USP (Unique Selling Proposition). So, as people started to work on their USP's they now work with various different companies to make a product and that product creates value for the customer. These companies are spread across the globe and are connected by series of

network nodes like – information, logistics, and finance. Also, the governing authority is not held by any individual company. They all are connected by various series of network stated above. Then year 2016 embarks the beginning of digital inclusion which is famously known as Industry 4.0, where the dependencies on technology increased more and it is mainly introduced to use the technological aspects more and more which can reduce monotonous and other heavy manual work.

### **Risk Elements & Vulnerabilities**

This global connectedness and interdependence have created various risk elements which makes the supply chain more vulnerable to threats. Before going ahead let's talk about what are the risks and vulnerabilities in more detail. What do you mean by risks, risks are nothing but all those events which creates variation or deflection in the flow of materials, information and finances across a supply chain? So, from where these risks elements come, actually these risk elements are already there in our Supply Chain but most often we are not able to know about them in a very clear manner. We already know that there are various tools in the market which are used to know & calculate the impact of these risk elements. e.g.: - Suppose we are having our supplier in Asia-Pacific country and if that country falls in flood zone than we should be knowing about various risk contingency factors of that country before we are sourcing majority of our product from them, these contingency factors are

known as risk elements. Now let's talk about vulnerability that what does it means, in supply chain terms vulnerability means weakness of supply chain which basically means extent to which supply chain is exposed to risks, more the vulnerability more will be chances of getting risks. So, Vulnerability means "an exposure to serious disturbance, arising from risks within the supply chain as well as risks external to the supply chain".

### **Robustness & Resiliency**

We are and will talk a lot about resilience in this research report, so now the question is what resilience is. There are two terms related to this, Robust and Resilience, what is the difference with respect to risk management between them. Robust means the ability to stay strong even after facing risk calamities up to an extent, whereas resilience means ability to come to its original form or desirable form when struck by any risk calamities or risk factors. Here, Robust talk about the physical strength or power which helps to reduce variability as it follows lean principle. Whereas, Resilience follows lean and agile principles both which means ability to come into its original or new desirable form which gives an idea about the flexibility and adaptability to with stand sudden changes. This gives us an idea about resiliency.



As according to a study by MIT researchers, in an organization around 50-60% of managers don't know about risk management principles and amongst the rest 40% who know about the risk elements or management techniques, most of them are unaware of the framework to implement these techniques. So, in our report I would primarily be focusing on step-by-step approach and also will provide framework that how one can make a supply chain more resilient and risk effective.

### **Methodologies and various frameworks to make Supply Chain resilient –**

There are series of steps and frameworks through which one can make Supply Chains more resilient –

1. **Know about your Supply Chain first** - Without knowing in-depth about supply chains one cannot identify various risk elements and if one cannot identify various risk elements then how one can improve those risk elements then.

So, for knowing Supply Chain in depth, we have to map our supply chain first and for that we will use **Supply Chain Ecosystem** concept.

So, now the question comes that what is Supply Chain Ecosystem –

- a. It is a network of companies, countries and their governments, social and political organizations.
- b. Natural, Industrial (clusters) and Financial & Human Resources.
- c. Delivery infrastructure including logistics and IT.

d. Connections, and knowledge of the industrial environment, interacting together with the landscape (Vertical Space) and Climate (Economic and Industrial).

So, how does a basic ecosystem look like? Let's talk about the four major forces in a supply chain ecosystem –

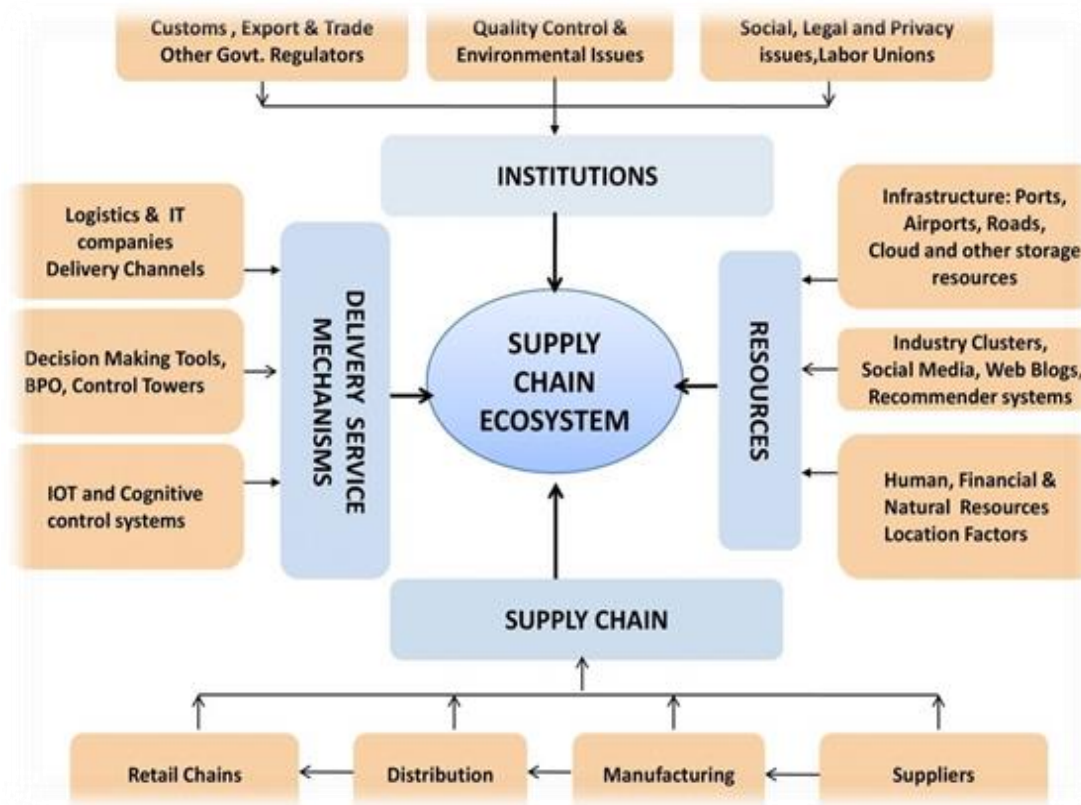
1.) Supply Chains.

2.) Resources.

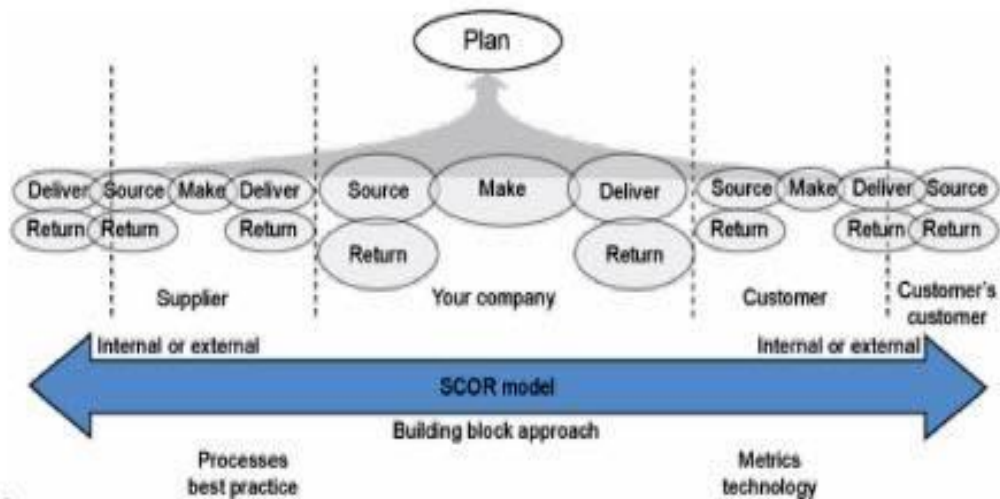
3.) Institutions.

4.) Delivery Service Mechanism.

Here is a basic diagram that how a supply chain ecosystem will look like –



2. **How one can know that where the risk is or may occur** – One can compare the SCOR Model with the mapped Supply Chain which we already did in step first and after comparing we can get to know about the risk elements.



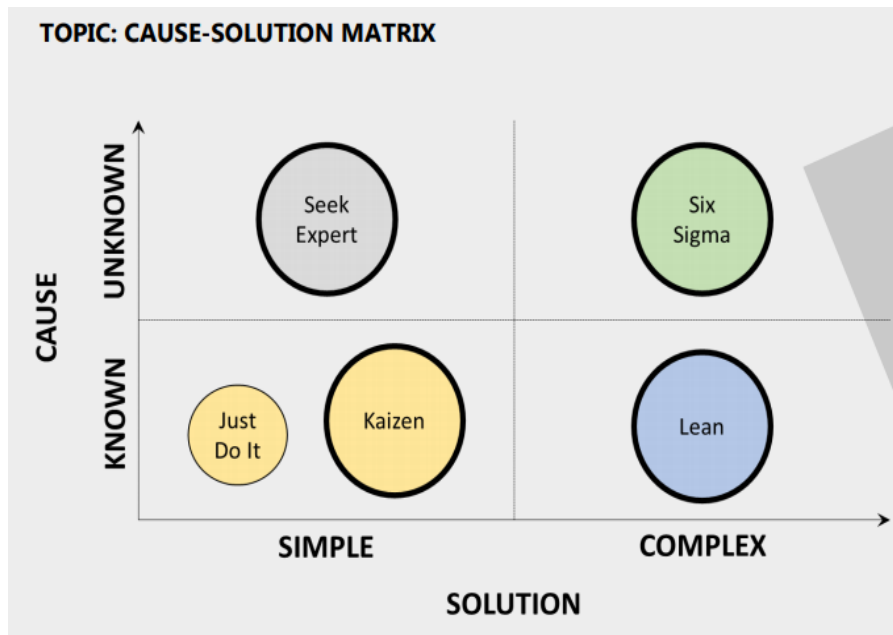
3. Now after knowing various risk elements. One should also know the causes for those risk elements and also one should be aware about which methodology one can really apply as to resolve those issues and make our supply chain more resilient.

For that I have given below few criteria through which one can decide that which methodology he/she can choose to make his/her Supply Chain more resilient.

a.) Firstly is below given cause solution matrix, here we use two important factors

1.) Cause which is responsible for the risk element.

2.) Possible solution for that cause.



**b.) If you wish to know where the Six Sigma, BPR, Kaizen, Lean or any other methodology can be applied, you can follow below steps:**

- Identify if the business process meets all process hygiene factors
  - To ensure the process hygiene factors are met, answers to ALL of the following questions must be “Yes”:
- a. Are all policies and procedures being followed without extensive monitoring?
  - b. Are employees adhering to scheduled login/logout times, breaks, meeting, and training?
  - c. Is the process turnover (attrition) under control?

- Identify if the key metrics of the business process are Red, Amber OR Green
- Use the below table to evaluate whether a business process qualifies for executing Six Sigma projects.

CATEGORY	PROCESS HYGIENE	METRICS	IMPROVEMENT METHOD
<b>A</b>	<b>MET</b>	<b>GREEN</b>	<b>BPR / SIX SIGMA</b>
<b>B</b>	<b>MET</b>	<b>AMBER / RED</b>	<b>SIX SIGMA / LEAN</b>
<b>C</b>	<b>NOT MET</b>	<b>RED</b>	<b>CHECKLIST / LEAN</b>

4. After knowing which methodology to apply we can apply that methodology

with other techniques like: -

- Collaborative Planning, Forecasting and Replenishment.
- Artificial Intelligence.
- Internet of Things.
- Machine Learning.
- Digital twining.
- Big Data.
- Simulation.

- h. Cloud Computing
- i. Cyber security.

**5. Now after implementation all above mentioned methodologies we can make our Supply Chain more resilient. But we have to take under consideration that we have to continuously look into all type of changes occurring in our Supply Chain Ecosystem on timely basis by using techniques mentioned in step 4.)**

### **Conclusion –**

After Inclusion of Industry 4.0, digitalization has increased which also increased further global interdependency of companies which further increased various risk elements of their respective supply chain networks. Here, the latest example can be seen in the form of Covid-19 which is asking very important question that why companies needs risk management and risk mitigation techniques and also forced them to re-think about these elements in a very detailed view. Here, in my conceptual project report I came up with the findings that for each and every Supply Chain one needs different methodology and different techniques and before implementing those techniques one should know about various risk factors or risk

elements and for knowing these risk elements one can use Supply Chain Ecosystem approach and also various methodologies like – SCOR. By, using the approaches which I have used in my project report one can easily map any supply chain with an ease and also can mitigate various risk factors.

The major finding of my conceptual project is that what criteria should one use before applying any methodologies and also one should use the various elements of Industry 4.0 together with the needful methodology. As, nowadays companies apply various methodologies and tools without even understanding that which tool or methodology will be best for them. So, this conceptual report provides a brief insight about the same.



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