

Supply chain mapping as advanced business model

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Abstract

Supply chain mapping is an essential part of every business activity, in order to develop and grow up competitive company positions. Supply chain mapping like an ongoing activity means gathering information on suppliers and sub-suppliers. and the people who work in your supply chain to create a global map of your supply network. This information can be held in a single data platform for ease operate and to facilitate analysis. This process aims to increase the traceability and transparency of the entire supply chain. The supply chain is considered a network of people interacting through the movement of a product or specific services from supplier to customer. In order to be able to achieve the highest level of operational efficiency in the coordination of activities between all subjects involved in Supply Chain Management, more and more companies are oriented towards the application of Supply chain mapping. It is a model where the company collects information on suppliers and subsuppliers managing high-level positions. This process aims to increase the traceability and transparency of the entire supply chain. The mapping can and should be used for supplier profiling and collecting information on a whole range of issues, including quality, sustainability and compliance issues. This information is a key for meeting sustainability standards and for improving working conditions for all workers involved in the supply chain.

Keywords: Supply chain mapping, Supply chain management, logistic sustainability, logistic operability

1. Introduction

In the last two decades, the Supply chain business model has been refined and intertwined with the growing efficiency and effectiveness through the major tools to improve supply chain activities.

Supply chain management plays a significant role in the corporate efficiency and well-being of any community. This activity has attracted the attention of numerous business and academic circles in the last few years. A review of the academic literature reveals an important surge in research in supply chain (SC) and supply chain management (SCM) practice and theory. Connecting and informing about the

characteristics, models and possibilities of supply chain management, and distribution channels contributed to a different serious approach to the meaning of supply chain in each society.

Successful business models are accompanied by fast and on-time same-day or next-day delivery, real-time tracking of the shipment, informing buyers about it, door-to-door delivery through a single, intuitive digital interface. Such changes affect the competitiveness and importance of the role of the supply chain in any modern economy. Supply chain management is no longer just a cost-cutting option: it's about service differentiation, increasing market share, even driving revenue as growing numbers of satisfied customers buy value-added products.

The Covid-19 pandemic has shown that the global supply chain in certain parts of the world has been disrupted, with countries and companies scrambling to put the pieces together. Shortages of critical inputs and raw materials have affected the production of virtually every manufacturer around the world. There was also a rise in raw material prices as countries and firms had to scramble for alternative suppliers due to global tensions.

The COVID-19 pandemic has made it clear that protecting a well-functioning single market is vital for any economy. The crisis has shown the essential role of transport and supply chain management for the full functioning of the market, and thus social, health and economic benefits. Every economy must project a quality and modern supply chain to overcome any crisis and strengthen strategic autonomy in global economic challenges.

As Ninda indicated in a 2022 study [1], each crisis, however, also presents an opportunity to look at old issues afresh. Firms across the world are redesigning their supply chains and changing the priorities and goals for it. Most companies are now moving away from the old paradigm, which focused primarily on cost reduction, to one that puts a premium on resilience. The shift is not just about finding alternate suppliers for critical inputs. It has meant a complete change in the architecture of the supply chain system, helped in no small measure by technology. The priority now is visibility of the supply chain at every point and with alternate suppliers having real-time access to the demand and inventory at every level and geography.

Matter of fact that the future of the supply chain is in a completely autonomous self-driving complementary ecosystem. With new technologies like blockchain, robotic process automation and analytics, autonomous trucks and drone delivery, the supply chain industry will eventually become largely autonomous to fulfill the business goals. "Blockchain technology has the potential to solve significant glitches in traceability and surveillance along the chain. It enhances efficiency across all operations of the flow of goods, information about the storage and shipping of raw materials, delivering finished products from one point to another, and more. The results are a greater collaboration, streamlined inventory management, better asset usage, and more." [2] Undoubtedly that as technology influences the future of supply chain ecosystems, businesses and leaders are embracing the change and adopting new strategies to turn the challenge into a business opportunity.

Nowadays, supply chain technology is powered reinvention by IoT, data analytics, blockchain and cloud computing systems. Digitizing the supply chain, sensorization and using modern digital tools, including analytics to optimize processes, are a crucial aspect in a networked ecosystem that is part of Industry 4.0. Using AI and machine learning and analytics solutions help in cycle time predictions and forecasting potentially disruptive events. Distributed ledger technologies allow supply chain stakeholders access trusted data. Smart contracts help remove blind spots and give real-time visibility into various operations. The ecosystem of Supply Chain Management and advanced technological tools like IoT, blockchain and cloud computing systems can be enriched with significant improvements, optimizations in conducting business through the implementation of the Supply chain mapping model.

2. What is Supply chain mapping?

Supply chain mapping is an essential part of every business model, in order to develop and grow up competitive company positions. Supply chain mapping it's an ongoing activity and means gathering information on suppliers and sub-suppliers. and the people who work in your supply chain to create a global map of your supply network. This information can be held in a single data platform for ease operate and to facilitate analysis. This process aims to increase the traceability and transparency of the entire supply chain.

Successful supply chain business models are accompanied by same-day or next-day delivery of various types of shipments, goods, and services, tracking the shipment in real time, informing buyers of its status, and all through a single, intuitive interface. Such changes affect the competitiveness and importance of the role of the supply chain in any modern economy. Supply chain management is no longer just a costcutting option: this business model is much more. It's about service differentiation, increasing market share, and even driving revenue as growing numbers of satisfied customers buy value-added products.

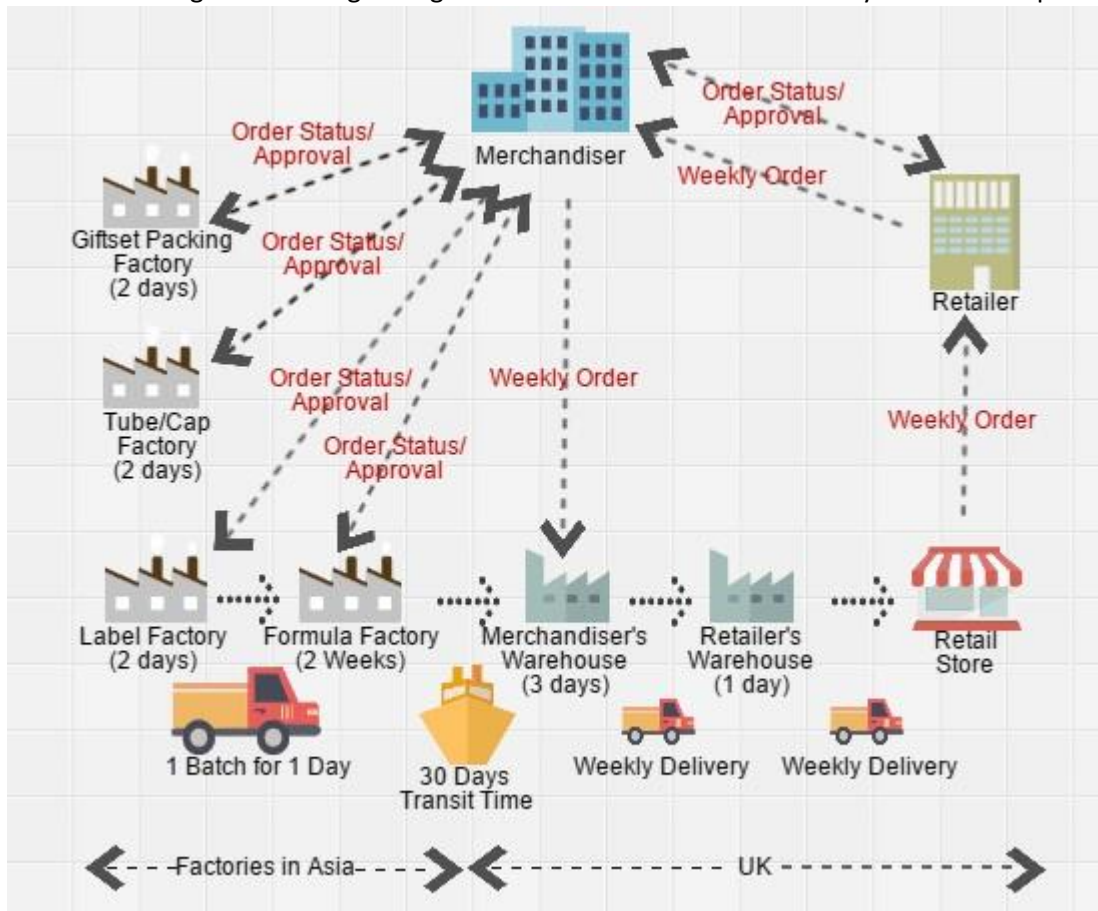


Figure 1 Supply chain mapping model

Source: <https://www.supplychainopz.com/2011/06/supply-chain-mapping.html> [03.03.2023]

Before proceeding to a comprehensive and clear definition of mapping in procurement management, let's briefly address the dimensions of the chain. The chain represents the entire input-output process that takes the product or service from initial conception to the hands of the consumer. The main segments in

the chain vary by industry, but typically include research and design, inputs, production, distribution and marketing and sales, and in some cases post-use product recycling. This input-output structure includes goods and services as well as a range of support industries. The input-output structure is usually represented as a set of value chain boxes connected by arrows showing the flows of tangible and intangible goods and services, which are key to mapping the value added at different stages in the chain and the layering of information. of particular interest to the researcher (eg jobs, wages, gender and firms participating in different stages of the chain). [3]

That means that the supply chain is considered a network of people interacting through the movement of a product or specific services from supplier to customer. In order to be able to achieve the highest level of operational efficiency in the coordination of activities between all actors involved in Supply Chain Management, more and more companies are oriented towards the application of Supply chain mapping. Adebayo Adeleke [4] defines Supply chain mapping is the process of connecting all sources of supply at every level of the value chain. It provides a complete, end to end picture of your supply chain, tracing every component from raw materials through to finished goods and back. Mapping your supply chain is an offensive move that adds resiliency and agility to your supply chain. It detects high-risk points of failure and establishes courses of action that increases responsiveness and limits blowback from disruptions.

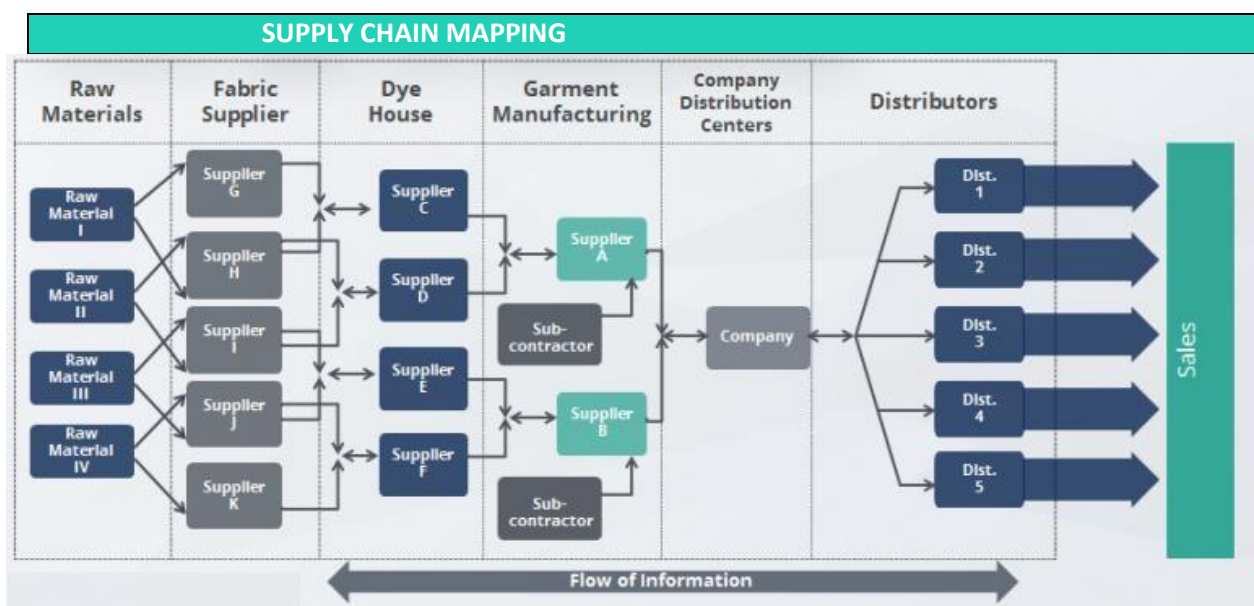


Figure 2 Supply chain mapping

Source: <https://www.leadership-sustainability.com/2017/05/03/implementing-supply-chain-mapping-into-your-business/> [09.03.2023] [5]

How to simplify the interpretation of the term Supply chain mapping? In many companies, people in transportation, logistics, purchasing, manufacturing, finance and other areas work in relative isolation. Essentially, each group specializes and does what it knows best, which it is more narrowly specialized in, but doesn't know exactly what other groups are doing. Putting them all together often reveals some surprises that can add a significant edge to the whole process. In such a clear overview of mapping, a

higher degree of optimization is achieved, which means that certain steps can be eliminated, some added, which makes the overall operation in the company much more efficient.

Each of these steps can be considered moving parts of the customer's supply chain, and each has its own associated processes and steps. The question is how smoothly do the moving parts work and what is the connection from one part to another?

Getting to that information requires a serious enterprise-wide review - one that includes a crossfunctional team of all the groups that make up the entire supply chain. There is a simple reason for this: while each person may have a deep knowledge of how their part of the supply chain works, even the most knowledgeable expert will not know every step of the process.

3. Benefit from Supply chain mapping

Supply chain mapping is an offensive move that adds resiliency and agility to your supply chain. It detects high-risk points of failure and establishes courses of action that increases responsiveness and limits blowback from disruptions. This is a model in which a company collects information on suppliers and subsuppliers managing high-level positions. This process aims to increase the traceability and transparency of the entire supply chain.

The mapping can and should be used for supplier profiling and collecting information on a whole range of issues, including quality, sustainability and compliance issues. This information is a key for meeting sustainability standards and for improving working conditions for all workers involved in the supply chain. [6]

According to MacCarthy and all. [7] at the core of production economics are the material flows associated with supply, production and distribution. The location of suppliers, production and distribution facilities affects the fundamental economics of production. As the global economy changes, the ability to capture and map the changes is a prerequisite for planning, managing, analyzing and controlling material flows to improve industrial practice. Many contemporary supply chain concerns give rise to the need for mapping the supply chain. Accurate maps are needed for supply chain performance management (Chae, 2009), [8] for supply chain re-design and improvement [9], and for the digitalization of the supply chain. Maps are also needed for supply chain risk management to manage operational risks and many emerging challenges, including sustainability, supply chain cyber security, climate change, and the global shortages of critical raw materials.

As Gereffi & Fernandez-Stark indicated, [10] all the industry actors must be mapped in the value chain and their main role in the chain is explained. The most common stakeholders in the value chain are companies, industry associations, workers, educational institutions, government agencies including export promotion and investment attraction departments, Ministries of foreign trade, economy and education amongst others. In addition, it is important to consider how relations between these actors are governed at the local level and which institutions are in a position to drive change. Thus, this type of analysis is critical to identify the key players in the value chain. It became especially relevant for industry upgrading recommendations and the development of an industry growth strategy in which each stakeholder plays a role to contribute in the development of the sector.

How to map your supply chain



Figure 3 How to map your supply chain

Source: <https://www.sedex.com/blog/supply-chain-mapping-how-to-get-started/>

Traditional Cost optimizing and asset minimizing supply chains that have sourced and served in a predictable world are shown to be opaque, inflexible and vulnerable to global disruption. One of the keys to business continuity during disruption is a resilient, digitally-enabled supply chain. That is, a multimodal network that promotes collaboration with suppliers, enhances operational performance, and reinforces the responsible reputation of the business. It will be the regulators that set the standard by which all companies must comply, but it will be the business's ability to meet the values of the consumer, investor, and employee that will help them gain competitive advantage. [11]

According to the Sedex.com [12] there are four key steps in the supply chain mapping process.

1. Learn where suppliers and their suppliers are located by working with procurement and using existing supplier lists.
2. Integrate information on your suppliers from different sources using a spreadsheet or data platform. Supply chains can change rapidly; a system for managing supplier data will help you to keep information current and in one place.
3. Conduct an initial risk assessment to help you prioritise where to focus next.
4. Use several tools to research your suppliers. Collect information about what is happening at supplier worksites, and research the inherent risks associated with the countries and sectors they operate within.

The process of supply chain mapping brings numerous benefits to a business that go far beyond simply providing visibility and meeting legal requirements. Mapping the supply chain can help your business learn

more about how their products or services are produced, where, and by whom. It is the foundation for building a risk management, due diligence, and responsible sourcing program in your supply chain.

4. The core of Supply chain mapping and understanding the difference between Linear and Networked Supply Chains

A supply chain is a long and complex process, usually spanning a vast spatial horizon, crossing multiple locations and country borders. Although the spatial dimension can extend to the entire global market, this process ideally requires closer cooperation between stakeholders, transparency and flexibility throughout the supply network.

Unfortunately, the traditional linear supply chains that still dominate global supply markets are not closely collaborative, they operate in silos, they are structurally and systematically fragmented, hence the inefficiency and incompetence.

The biggest obstacle to widespread transformation in industrial business networks is trust in network business partners and, perhaps even more, in reliable, secure technology tools that technically support this trust, making communication timely and secure.

Especially in data-intensive partner network relationships, guaranteeing one's own data sovereignty is inviolable: the ability to not only monitor, but actually control at all times where and how relevant business data is stored and processed - but even more, to whom third parties can access this data and whether it is handled according to previously agreed terms.

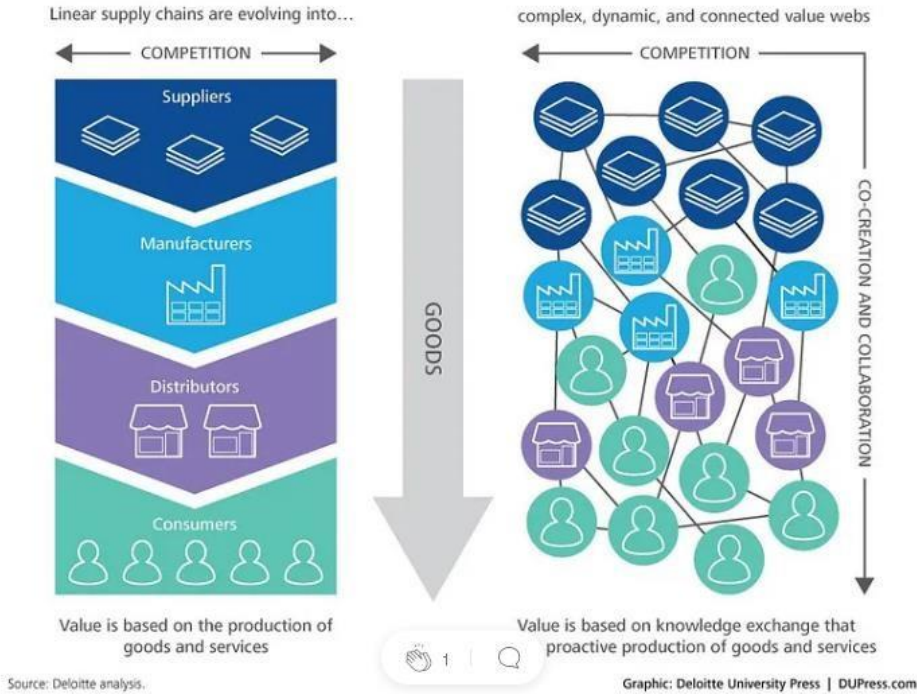


Figure 4 Supply chains evolve into value webs

Source: Kelly E., Marchese K. (2015) Supply chains and value webs. Deloitte University Press. 2015.p.V. [13]

Marian Temen [14] has argued that the global market needs Digital Supply Networks (DSNs) which are based on closer stakeholder collaboration, systems coordination, real-time data application, and operated as a digitally linked ecosystem of supply related activities that mirror and enhance the physical supply system on the ground. A tightly knitted network of interdependent, highly connected partners working collectively to drive for a better business outcome for all stakeholders, especially consumers.

Closer collaboration between supply network stakeholders, interlinkage of operational processes and end-to-end interconnectivity of technological systems, are vital to the effective management of supplies.

According to Gary Hafifan [15] Digital supply network (DSN) allow companies to shorten processes, potentially eliminate functions, and identify ways to be more competitive with new services and products. For instance, companies may not need purchase orders because sensors embedded in products could enable an auto-receipt function upon delivery, and trigger a transfer of funds for payments.

In fact, we know that the value of the DSN to your business is not to import or replicate your existing supply chain into new networks. Rather, it is to reimagine and redesign the value of your business through a DSN lens.

Digital technologies contributing to the Industrial Internet of Things are creating new vistas of opportunity, and companies need these DSNs to help them be more competitive. It appears that the traditional model of shipping large quantities of the same product to retailers and distributors is already a thing of the past. Also, the current data sharing approaches are limited and cannot sufficiently cover all requirements that have been partly described above to support a scalable enterprise usage.

Mazza [16] indicates shifting from a traditional supply chain to a supply network creates room for growth, optimizes operations and improves service while reducing costs and working capital. At the same time, this new model introduces greater levels of complexity as organizations must now manage the flow of materials, products, and data between and amongst a growing number of ecosystem partners, all of which must be coordinated to maintain stability in the network. A fundamental challenge for consumer goods manufacturing organizations is not only to produce goods quickly and economically, but to anticipate the multitude of demand and supply variables that could affect the equilibrium in the supply value network (including shortages of raw materials, changes in demand and increasing fuel costs) and to proactively solve existing problems.

Conclusion

The issue of the supply chain has been given much attention in recent decades, both in the academic arena as well as in the business world. It has become so important that companies have begun to directly manage the supply chain, illuminate specific managers to perform this practical function. Every successful business models are accompanied by plenty of information, which concerns on fast and on-time sameday or next-day delivery, real-time tracking of the shipment, informing buyers about it, door-to-door delivery through a single, intuitive digital interface. Such changes affect the competitiveness and importance of the role of the supply chain in any modern economy. Supply chain mapping it's an ongoing activity and means gathering information on suppliers and sub-suppliers. and the people who work in your supply chain to create a global map of your supply network. This information can be held in a single data platform for ease operate and to facilitate analysis. Mapping the information flow allows the identification of the

path of the information which triggers the material flow from the supply chain. This process aims to increase the traceability and transparency of the entire supply chain.

Mapping, storing, documenting and processing data from the supply chains of the organizations studied is complex and difficult process, despite corporative efforts to implant supply chain programs. Digital technologies contributing to the Industrial Internet of Things and blockchain technologies are creating new vistas of opportunity, and companies need these DSNs to help them be more competitive. It appears that the traditional model of shipping large quantities of the same product to retailers and distributors is already a thing of the past. In this vein, blockchain technologies can play a groundbreaking role in improving the traceability, accountability, and sustainability of complex supply chain networks.

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