Supply chain Porfolio

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Introduction

Supply chain management and the related concepts are becoming significantly important since it is a cornerstone of competitive strategy and helps to increase the market share as well as increase the shareholders' value. In order to do to that, the companies have to operate in a coordinated manner and as a result, it must collaborate with the review of plans, schedules or strategies. Firstly, there should be an understanding of the definition of the supply chain management in general. A supply chain is defined as a process consists of not only the suppliers and manufacturer, but also warehouses, retailers, transporters, retailers, and customers. (Chopra & Meindl , 2000). Supply chain management is the management of the flow of services and products and includes all processes that convert raw materials into final products. It associates the active streamlining of a business's supply-side activities to gain the customer's value and bigger market share. (Investopedia , 2022).

In this portfolio, some indispensable topics of the supply chain management will be covered in terms of:

- Supply chain elements (Plan, Source, Make, Store, Delivery and Return)
- Supply chain strategies (Lean &Agile, Pull &Push, Standardization, Customization and
- Supply chain elements (Plan, Source, Make, Store, Deliver and Return)
- Supply chain qualifications (TQM, industry standards)
- Risk and vulnerability (Nuil, 2022)

1 Supply chain elements

This chapter lays foundation of the theories of supply chain elements and practical applications of the elements as well as giving descriptions of key concepts. Supply Chain elements includes six key elements which are planning, sourcing raw materials, manufacturing, storage, delivery and returns. While the planning phase has contributed to develop an overall strategy for the supply chain, the others are considered to execute that plan with the specific requirements.

1.1 The element Plan

1.1.1 A theoretical framework of Plan

Supply Chain Planning (SCP) is the forward-thinking process of combining all the assets to optimize the delivery of information, services, and goods from supplier to final customers. (Gartner Glossary, 2022). This includes various processes such as supply planning, demand planning production planning, sales and operations planning and distribution planning. (Mangan & Lalwani , 2016).

Sales and Operation Planning

Sales and Operation Planning is defined as a tool that connects different business plans to one integrated set of plans. It has two main purpose which are to build bridges between the business or strategic plan and the operational plans of the firm as well as balance the demand and supply. (Antonio, Scavarda, & Fernandez, 2012). According to Hart (2021), it is a business management process where the leader and the team members ensure every business department is aligned to balance demand and supply. (Hart, 2021).

Characteristics of sales and operation planning are as follows: (i) it connects strategy and

operations, (ii) it has a planning horizon from 12-24 months (iii), it finds down the potential gaps between supply and demand, (iv) it needs the main input in demand and capacity, (v) it could take around more than three weeks to integrate all of the plans of the business in an unified plan (forecast, plan and discuss the plan). (Antonio, Scavarda, & Fernandez, 2012)

Demand Planning

Demand Planning is defined as a cross-functional process that supports businesses meet customers' demand for goods while preventing supply chain disruptions and reducing excess inventory. (Jenkins, 2020)

It is easy to only forecast the one customer and one product, however, the demand is including thousands of customers or products in reality. It is even impossible to list all products and customers (in the customers goods industry) as well in some cases. Moreover, demand planning usually covers 12-24 months, so it is indispensable to define proper planning structures for consumers, products, and time. This involves in the input to the forecasting process, historical transactional data, or customers' data. The demand planning process includes the following steps: the first step is the collecting of input data such as forecast data from historic customer orders, former planning runs, shipments and then doing the computation of further data. The third step is to do the judgmental forecasting which reviews the planning situation (by the human planners). Next, applying judgements or doing consensus forecasting. Then, planning of dependent demand, for example, the demand of components of the finished goods (configurable products or product bundles, etc.). The last step is to release of the forecast to further and execution processes, e.g., collaborative planning, allocation planning or purchasing planning. (Kilger & Wagner, 2013).

Supply Planning

Supply planning is considered as the entire planning process which consists of distribution, and procurement operations according to demand planning, considering material availability and capacity constraints. (Deloitte, 2022) Their features are time horizon of 12 months, main input is the demand plan, and its purpose is to create the production plan and the material requirement planning. (Anaplan, 2022).

Production Planning

Production Planning is defined as solutions on making more use efficient of manufacturing assets and decreasing the inventories. (Greeff & Ghoshal, 2004). Another definition of production planning is integrating a multiplicity of production components from the daily activities of employee to the capacity to know correct delivery times for the consumers.
(Kiran , 2019).

Distribution Planning

Distribution Planning is defined as a systematic access to assure the procedure completely cover the delivery products to various distribution centres is finished thoroughly noticing which goods are to be supplied in what location and what quantity in the wanted time. (MBA Skool, 2016). The term "Distribution planning" was mentioned by Adam (2020) refers to the process of planning the movement of products from manufacturer to customers. It includes various

activities such as packaging, warehousing, supply chain and logistics. (Investopedia , 2022). There are several important features of distribution planning which are the main input is from customer orders and it plans to distribution products/ services to consumers in the weeks or months. In summary, distribution planning is an indispensable element of the business cycle and the supply chain management since the profit margins depend on how quickly they convey the products.

1.1.2 Business example 1

One of typical example of making sales and operation planning is the well-known chain of global convenience store, Circle K. They have accurately predicted supply and demand down to individual-station in Europe. More specific, the planning teams at Circle K now have a dynamic forecast per station and product by using the intuitive forecasting and scenario-based planning, they can know exactly where and when to send fuel. By connecting to the customers and be aware of their demand, the company could save money with creating an accurate view of capacity needs thanks to the outsourcing. (Anaplan of Supply Chain). This company bridges the gaps between supply and demand as well as providing the main input in demand and accurate capacity which helps Circle K know how much they will sell and where they can distribute it to sites. (Anaplan, 2022).

1.1.3 Business example 2

Demand planning

A direct-to-customer cosmetics brand is growing quickly, and they are selling 10,000 orders per month. Based on their past sales data, upcoming campaigns, and ad, they plan to be above 30,000 orders per month at this time next year. However, due to the Covid 19 (the store close for while) and the general market conditions in the industry, customer's data at the end of the year which are not good, this brand must do the judgement for the numbers of orders next year down to 24,000 and make the consensus forecasting. Then, planning the product bundles demand if it does have. The last step is document or release of the total forecast for implementing.

1.1.4 Business example 3

Demand planning

Walton Seed Company was founded by Eric Walton in Toledo, Ohio, and subsequently moved to York. Walton continued its catalog business in the Middle Atlantic states and served retailers directly in Pennsylvania, Maryland, and New Jersey. It is true that the seed business is traditionally sold very well in the spring and early summer, however, it dropped off dramatically for the rest of the year. As a result, the catalog sales help to spread out demand a little by doing the promotion, but overall, the sales are still very concentrated. Therefore, Walton pushes inventory out into its warehouse during the fall and winter to be ready for the upcoming summer and spring. During the season, the company runs out of certain types of seeds and has an abundance of others. The wholesalers and retailers complain about the stockouts. They have to accept substitution for a while but not often enough. The wholesalers and retailers do not provide in-season sales information and tend to buy large quantities prior to the start of the

season. It is a set of problem that the company should solve by improving in-season sales forecasting that is more responsive to demand and sales. By conducting the demand planning, it will be easier to do the business smoothly and effectively and improve service to their customers. (Langley & Gibson, 2009)

1.1.5 Conclusion

To conclude, it depends on the characteristics of the problem which company is dealing with to choose planning. It would be very important of company understand thoroughly the goals and features of the types of planning. Designing Sales & Operation Planning and manage the motives of demand usage are very necessary. To make this successful approach, the team should have good demand visibility across the supply chain and keep in mind managing the usage patterns and supply in a way that creates the supply chain surplus. The planning team always ensure that the S&OP or demanding plan should be modified as the reality or forecasts change since the supply circumstance may leave the reality different from plan. Even if there are no short-term warning, the output of the S&OP process should be edited as forecasts are adjusted.

1.2 The element Source

1.2.1 A theoretical framework of Source

Purchasing is a term stands for the function of and the act of procuring equipment, supplies, services by a company or other organization. (APICS Dictionary, 1998). The purchasing processes includes these stages: define the specialization, select supplier, contract agreement, ordering, expediting, and evaluation follow up. (Romney & Steinbart, 2006). The first important business activity in the purchasing processes is to getting specialization or a recognition of a need for a purchase to be made. The MRP (Material Requirement Planning) system, a forecast may be needed to identify the materials, equipment, etc. If it is considered to be a routine purchase, the supplier's name is normally used by the purchasing's office. If it not a routine purchase, selecting supplier will be the next step and the purchasing agents could obtain the recommendation from users, search the internet or request information from the potential suppliers. To ensure the adequate supplier selection, purchasing agents will request for quotation or prequalification of suppliers. Then, the company will invite the sources to bid by sending a request for proposal (RFP) or quotation to them. A bid which is acceptable should include the appropriate price, the suitable products with specialization and reputable providers. If the bid is acceptable, the purchasing department will set up a purchase order or making a contract. The items will be purchased and used later, besides, the purchasing department will monitor and evaluate the progress of the order. Meanwhile, they also do the trouble shooting and establish expediting routine. This may be done with some follow-up report or evaluation.
Kraljic Product Portfolio (Nuil, 2022)

Kraljic's (1983) product portfolio based on two variables:

1.**Purchasing's impact on the bottom line**
the profit impact of a given supply item measured against criteria, such as cost of materials, total cost and volume purchased

2.**Supply** **risk**
measured against criteria, such as short-term and long-term availability, number of potential suppliers and structure of supply markets.
(Ferreira & Kharlamov, 2012)

Table 1 Kraljic matrix and typical items purchased

Strategic impact		Supply risk: Low	Supply risk: High
	High	**Leverage** Mix of commodities and specific materials	**Strategic** Scarce and/or high value materials
	Low	**Non-critical** Commodities, some specified materials	**Bottleneck** Mainly specified materials

Figure 1: Kralijc matrix and typical items purchased (Ferreira & Kharlamov, 2012)

Leverage items are known as the "best" placed items. They hold a considerable business share (high strategic impact) while the risk is reduced, nonexistent or already mitigated by some specific strategy. The supply process is mature and well established. Strategic category is all about future strategy; this class of products has high impact on business and high risk. Specific management practices are required, e.g., long-term relationships with suppliers, continuity plans and strategic planning are crucial. Successful management of this category of products/services can mean the difference between the survival and demise of a company. Bottleneck items are the most underestimated and ignored items. They have very low business impact, but a high supply risk. They are very likely to suffer supply interruptions and delays, among many other types of supply disturbances. The lack of such items can delay the whole projects or production lines, e.g., the lack of a cheap O-ring can be responsible for holding up an important piece of machinery. Finally, the non-critical items have a low impact on business and low supply risk. This is the least important category, in which high performance and low cost are the drivers. For example, supply process is mature, the supply market is healthy; there are plenty of choices and alternatives. (Ferreira & Kharlamov, 2012).

Purchasing strategies

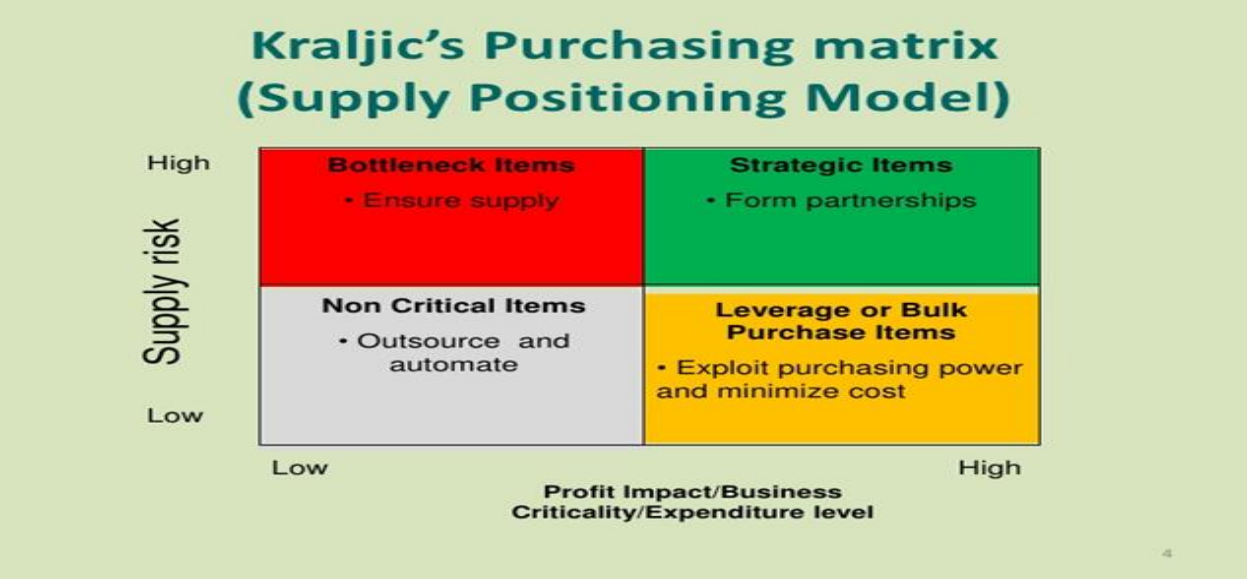

Figure 2: Kraljic's Purchasing Matrix (Anaplan, 2022)

1.2.2 Business example 1

The typical example of the purchasing order is about the CAS company which located in Viet Nam. It needs the materials, equipment from Germany to support bidding contracts for each project of CAS Company. The Department of Commerce and Materials (Purchase Department) will be in charge of importing and supplying the materials and equipment for construction bidding projects. After winning the bid for projects, the Technical Department contact to Purchase Department in identifying the specifications and once needs has been confirmed. The next step is selecting the supplier and the purchasing department will evaluate the qualification of suppliers via price, quality of materials as well as dependability in making delivery. Then, they will do a purchase order or a formal contract with the suitable suppliers. The next major business activities in this stage are receiving goods, materials or equipment. It could be more complicated in the CAS company since they had a problem before which was checking the incorrect quantity of goods, resulting in inaccurate inventory records. This mistake could be avoided if they know how to ensure clerks to sign the receiving reports as well as entering the employee numbers in the system. It could be better if not to inform receiving-dock workers about the quantity order so they could check carefully and accurately all deliveries. The purchasing department employee should count, check and compared the goods which is ordered and received carefully and finally make a receiving report. Another problem is the supplier's inability to meet delivery dates which leads to the bad consequences. After this stage of receiving goods, the company will approve vendor invoice and do the cash disbursement and ultimately, the follow-up evaluation will be set for the next time. (CAS , 2020)

1.2.3 Business example 2

Application of Kraljic's purchasing portfolio matrix in construction industry – A case study

The application of Kralijc portfolio is on Portuguese large construction company that operates worldwide but operating primarily in Portugal, Agola, Mozambique and Guinea-bissau. This case is suitable since the company has well established international supplier base (more than a

thousand supplier) and experienced result of more than ninety years of activity constructing worldwide. (Ferreira & Kharlamov, 2012). The company has conducted research by the team of Supply General Manager, Internal Control General Manager, Division Manager, and International Procurement Manager to investigate the applicability of the Kraljic purchasing portfolio matrix for construction industry and founded out:

Table 7 Distribution of the purchased amount among the four categories

Categories	Strategic	Leverage	Bottleneck	Non-Critical
Percentage of total amount purchased	27%	37%	22%	14%
Number of classes (out of 29)	4 (14%)	7 (24%)	11 (38%)	7 (24%)

Figure 3: Distribution of the purchased amount among the four categories (Ferreira & Kharlamov, 2012).

It could be seen that most of the categories achieved the expected position in the matrix.
The strategic and leverage categories contribute the biggest share of the portfolio. The company should adjust the categories to be central and know exactly the amount spent on kind of categories based on the Kraljic's purchasing portfolio matrix.

1.2.4 Conclusion

All in all, supply chain problems always happen not only in ordering or receiving goods but also in many cases during their use such as receipt of the wrong quantity of materials, receipt of damaged materials, nonconformance of materials to specifications, or change the specification of the equipment, etc. To resolve those problem, it is the best way to keep in touch with the suppliers of the goods and make a clear solution for that. Another solution could be carefully checking the quality of supplier at the beginning by requiring the quotation, Test repost, Rouser test and checking the ranking of supplier of Certificate of Origin.

1.3 The element Make

1.3.1 A theoretical framework

Production cycle is defined as a repeated set of information processing operations and business activities with related to products manufacture. (Romney & Steinbart, 2006). The production process tends to perform a group of activities to transform resources into output. (Langley & Gibson, 2009) . Operations focus on the "make/build" part of the supply chain. It is said that "make" and its portion related to the production cycle which includes four stages: Product Design, Planning and Scheduling, Production Operations and Cost Accounting. (Romney & Steinbart, 2006). In the Product Design stage, there are two needed documents which are bill of materials (BOM) and Operations list. Bill of materials is defined as a document that have three important components: Part number, description, and quantity.

FINISHED PRODUCT: BLU-RAY PLAYER

Part Number	Description	Quantity
105	Control Unit	1
125	Back Panel	1
148	Side Panel	2
155	Top/Bottom Panel	2
173	Timer	1
195	Front Panel	1
199	Screw	6

Figure 4: Example of a Bill of Materials (Romney & Steinbart, 2006)

Operations list is defined as a document that specifies the sequence of steps to follow in making a product, which equipment to use, and how long each step should take.

OPERATIONS LIST FOR: CREATE SIDE PANEL

Operation Number	Description	Machine Number	Standard Time (minutes:seconds)
105	Cut to Shape	ML15-12	2:00
106	Corner Cut	ML15-9	3:15
124	Turn and Shape	S28-17	4:00
142	Finish	F54-5	7:10
155	Paint	P89-1	9:30

Figure 5: Example of operations list (Romney & Steinbart, 2006)

It is known that products could be produced according to the forecast or demand and their production goes through one of the four manufacturing methods such as make-to-stock (MTS), assemble-to-order (ATO), build-to-oder (BTO), and engineer-to-order (ETO). The organization could blend of these four assembly processes. MTS is defined as the production method which products are produced before receipt of a customer order. On the other hand, ATO production occurs when receiving the receipt of a customer's order. The BOT (also called make-to-order) production is likely to delay assembly until the order is confirmed. The last production type is ETO (Engineer-to-order) which focuses on the production of highly tailored products for consumers whose special requirements related to impactful customization.

1.3.2 Business example 1

Production involves the on the production of the products or service that meet the customer's requirement. For example, one of the most famous computers in the world is Dells which assembles a set of components such as motherboard, video drivers or hard drive into the computer that you use. Dells need hardware and software to build computers that needed to be produced. Dell and other companies are using the pull-based systems to manufacture the desktop computers, they wait to receive some specific order via its website or call center and then assemble to the customers specification by obtaining components from third-party warehouses.

1.3.3 Business example 2

Another typical example could be the production of sandwiches of Burger King, this store will start with product strategies related to product design and assembly methods. It offers assemble-to-order products that are created from a variety of ingredients such as vegetables, cheese, and pre-sliced meats and then it will be delivered to the customers.

1.3.4 Business example 3

Fuijtsu Computer Systems, the U.S subsidiary of Tokyo-based Fujitsu Ltd had a computer market in the North American in 1996. In the beginning, the company, which was making the products to forecast, and it turned into a big problem when no profit is created. Then, it needed to find a production model which would allow it to better align inventory with customer demand. Finally, they turned to make-to-order manufacturing strategy and until this model, the company receives order from the American customers for its laptop and computers and builds them in Japan and ships back to the United States. By using this production strategy, the company could reduce the need to keep inventory in stock. Once the order is set on their website, the system will calculate the delivery date from Fujitsu's Japanese factories and the plant in Japan will make the products and get parts from more than hundred suppliers. Then, they will turn the products to packaging stage and over to freight forwarders, which manages the movement of goods to US. When selecting the packaging materials, the company did consider of environment protection. All in all, this production strategy is suitable for the company and there is no such thing as forecasts and the only thing you do is manage the demand. (Langley & Gibson, 2009)

1.3.5 Conclusion

In conclusion, the production strategy and planning outcomes combined with product characteristics will affect on the production execution decisions. The company should have effective choice of assembly processes which can help the company be able to manage its variability of demand. The company could make the best selection or combine one of the production strategies. Based on the two cases, it seems that demand variation, the products' level, production complexity will drive the suitable selection of production.

1.4 The element Store

1.4.1 A theoretical framework of Store

The element store is one of the important elements of supply chain which will be explained in this part. Some basic features such as added value of a warehouse, warehouse types, flow will be explained. In addition, this comprises some core sections which are the importance of inventory management, Inventory control system, etc. The first knowledge base is about inventory definition and the importance of inventory management or some reasons why the company keep stock. Inventory could be also called the materials and it is an asset that company keeps meeting the customer demand. ((Mangan & Lalwani , 2016).

Table 9.1 Reasons for holding inventory

Buffer against uncertainty	Economic trade-offs
Maintain customer service levels for volatile demand	Production batch size
Hedge against price and exchange rate fluctuations	Transportation batch size
Protect against delivery lead-time variability	Transportation mode
Buffer against unreliable supply sources	Order quantity size
Buffer against seasonal demand and supply	Order frequency duration
Maintain availability of scarce products	Bulk purchase savings
Provide cover for emergencies	Supply price fluctuations

Figure 6: Reasons for holding inventory (Mangan & Lalwani , 2016)

The inventory control system will be also mentioned in this element since it is very helpful to aid manager decide when to order inventory and in what quantity. The two basic systems are used such as the reorder point inventory control system and the period inventory control system. (Mangan & Lalwani , 2016). The when is called the reorder point, depends on the inventory levels or some number of units. The example will be demonstrated below. In term of matching inventory policy with inventory types, ABC analysis will be used as a tool to separate out the most important items, compared with the least attention items. ABC is a technique of inventory control. There are a variety of reasons why ABC analysis is used, one of them could be ensuring control over the costs items as well as reduction in the storage expenses, resource allocation. (Mangan & Lalwani , 2016). Barcoding is a sequence of vertical bars and spaces that comprises of five parts: a stop character, a quiet zone, a start character, data characters, and another quiet zone. Another definition of bar code is defined as a series of parallel white and black bars, both of varying widths and presents a lot of numbers. (Langley & Gibson, 2009). There are two main bar codes scanners which are automatic and handheld. The inventory management uses barcode to optimize the efficiency and tackle the challenge of inventory. Some other benefits of barcode could be related to speed, accuracy, ease of implementation and cost of effectiveness. (Ponties , 2021).

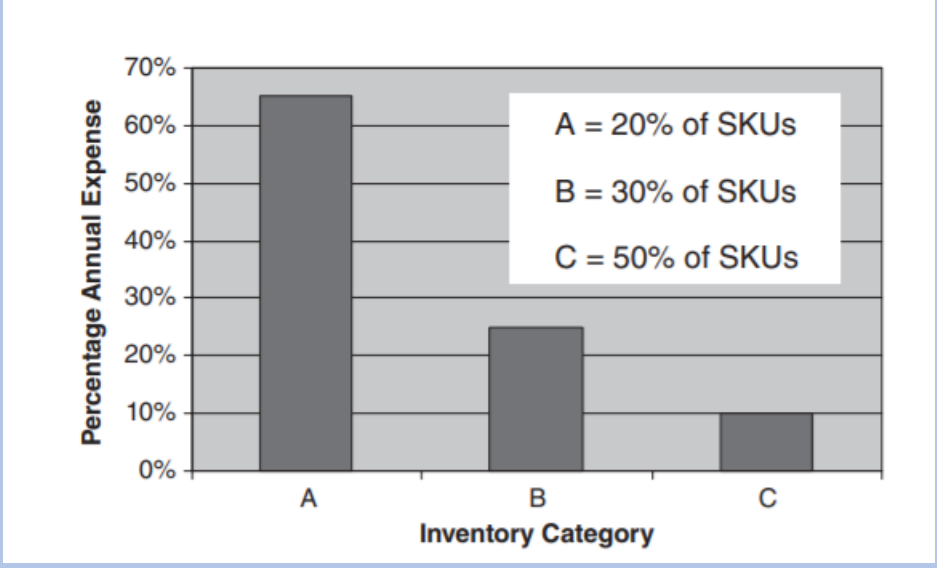

Figure 6: ABC Classification (Langley & Gibson, 2009)

Inventory flow type

There are three main important types of inventories which are: base flow inventory, wave inventory and surge flow inventory. The base flow inventory is mainly the core business products. The surge products have dramatically various demand and the last one is wave flow which is also unstable and is exemplified as fashion type products. (Gattorna & Walters , 1996). It depends on the company to choose which type of warehouse layout to optimize the space and easier materials handling.

Warehouse is broadly interpreted as a wide space of facilities and locations that provide storage of goods, raw materials, warehousing, and the finished goods while they are in transport. (Langley & Gibson, 2009). There are basically three types of warehouses layout, for example: Straight flow, a U flow, and an L flow. It depends on the company to choose which type of warehouse layout to optimize the space and easier materials handling. It depends on the company to choose which type of warehouse layout to optimize the space and easier materials handling.

1.4.2 Business example 1

The reorder point will be counted as the following: The order transmittal takes one day; preparation and order processing consume 2 days and delivery takes around five days which results in a sum of eight days for the lead time or replenishment time. It is given that demand is ten units per day (3,600: 360), the reorder point will be 80 units (8 days *10 units per day)

1.4.3 Business example 2

Barcoding could be encountered anywhere, for example, in large retail outlets such as supermarkets, where the cashier often checks out the goods for customers by using bar codes. The supermarket tends to remove the practice of labeling every item with a price tag. More important, the bar code makes a great contribution to much more effective inventory control. In addition, some giant company such as Amazon, Bol or Alibaba of China use it on cartons and monitor and scan the codes as the cartons flowed into the warehouse to distribute to the stores, retail. It cannot deny that bar coding at the warehouse has vital impacts on data collection accuracy, receiving operation times reduction. Moreover, thank to using the bar coding, these companies could integrate data collection with other areas which leads to better database and inventory controls. The warehouse employees could depend on it to prepare for orders quickly.

Conclusion

In conclusion, there are some vital terms and techniques which is very important for company keeps in mind to operate and maximize the benefits. Bar coding is very important for the company since it helps to identify the package and its content which directly leads to enhance the efficiency of the product storage and retrieval. It offers a variety of benefits which are mentioned above and for further research, it also has affected packaging, materials handling and inventory control. The case in point is in the supermarket or enormous corporation such as Amazon, Alibaba has been using it to make effective inventory control.

The element Deliver

1.4.4 A theoretical framework

"Deliver" belongs to the supply chain elements when it refers to the transportation system which is the physical link connecting to other channels members such as raw materials suppliers, plants, warehouses, or a company's consumers. (Langley & Gibson, 2009). It is true that transportation surely adds value to the company by creating place and time utility and helps the movement of products to customers. Nothing could be further from the truth, some kinds of transports such as sea, air, land, rail, multimodal or intermodal transport are used by many companies around the world. Because the quality of the transportation service could bring a lot of benefits as well as affect directly on inventory costs, stockout costs or the cost of operating the facility.

Sea

Water transportation plays a vital factor in the today's economy since it offers various benefits. The most advantage of using this kind of transport is its low cost because the average revenue per ton-mile for water carriage is lower than that for rail, motor, and air. It is great for longer distances by using the cargo ship, deep sea, or tanker, etc. (Langley & Gibson, 2009) It could produce lower the amount of CO2 than other type of transport such as truck. The common type of ocean vessel in usage these days are cargo which could handle a large variety of cargo. These ships have tween deck which is a deck between the main deck and the main holds. Container ships are increasingly significant today because of its characteristics. More specifically, the ships tend to be designed to carry the standardized containers, which could carry up to 5,000 TEUs (twenty-foot equivalent units). ((Langley & Gibson, 2009). Water transportation, however, has the disadvantage which is a slow movement method, and it needs more facilities such as harbor.

Air transport

Air transport has major advantages related to long distances, short transport time. Thanks to its speed, many company could be saved from moving the emergency shipment to the customers. However, this type of transport has a big disadvantage which are the cost which leads to limit the numbers of shippers. Another drawback could be the increased transit time during the bad weather, or most companies must depend on land carries or transport freight form the transport when using this air carries. (Langley & Gibson, 2009) It also offers the small quantity of products and high transport cost per item.

Land transport

Rail transport have many advantages and disadvantages which the company should take into consideration when using this transportation. For example, a major advantage of using the rail transport is the long-distance movement of products in large quantities at relatively low rates. (Langley & Gibson, 2009). There are some products which uses this type of transport are products of forests, mines, and agriculture. The reasons are about the low transport cost per items, low C02 or high possible quantities. The primary drawback of rail transport is low accessibility. It must follow the fixed routes (rails).

Road transport

Road transport is very much part of any companies' logistics supply chain since it has very flexibility and great for shorter distances. It has the low fixed cost and high variable costs as well as does not invest in its own highway. The major advantage of road transport is its ability to access to any destination inland. However, it also must pay for highway use via fees or taxes. It also produces the high amount of carbon footprint which is bad effect.

Intermodal transport

Intermodal transport is considered to use the two or more of carries of different modes to do the movement of shipment. (Langley & Gibson, 2009). For example, rail-water, pipeline-water and pipeline-truck or piggyback, fishy back or birdy back (other names). The advantage of this model is to utilize the economical services to meet the customers/companies 'need. The biggest problem of this model related to the transfer of freight from one mode to another. (Langley & Gibson, 2009). For example, air/sea combination where carries combine ocean and air transport to move to shipment. There are two advantages of using them which are the cost and speed. The expense of combining two modes is less than that of an all-air movement. Two, it is faster than other transportation. Another popular one is roll-on-roll-off which is similar to container shipping, except that the carrier uses standard truck trailers instead of containers.

Indirect and special carriers

There are other categories of carriers which are small package carries, consolidators, freight forwarders and shipper associations, brokers and intermodal marketing companies. (Langley & Gibson, 2009)

Documentation – Domestic

Bill of lading is probably the most single important document in the transportation document. It includes shipper address, Consignee Address, Bill of Infor, Carrier and Freight Details. (Arktransportation, 2022). There are two kinds of bill of lading, the first one is straight bill of lading and order bill of lading is the second one. Straight bill of lading is a non-negotiable instrument and order bill of lading is a negotiable instrument showing certificate of title to the goods it names. There are some important major terms in bill of lading such as: common carrier liability, reasonable dispatch, cooperage and baling, articles of extraordinary value, explosives, no resource, substitute bill of lading, water carriage, alterations.

There are some major terms which could be found in the bill of lading sections such as common carrier liability, reasonable dispatch, cooperage and baling, articles of extraordinary value, explosives, No resources, Substitute bill of lading, Water carriage, etc.

(Langley & Gibson, 2009)

1.4.5 Business example 1

Double D Trucking

Double D Trucking was started by Douglas Dean in 1981 and has grown from a one-truck operation to a 550-tractor-trailer fleet serving shippers in a five-state region in the upper Midwest. Double D serves the automotive industry by providing inbounding transportation to the assembly plants. It has a strategic alliance relationship with the Big Three auto makers and

is the exclusive trucking company for several the auto suppliers. It is a most famous company in the trucking industry. However, this company has seen increased competition since long-haul trucking has come under severe competitive pressure from rail piggyback and regional trucking. The most perplexing trend to Dean is the growing vertical integration of trucking companies to into other logistics services. A number of regional trucking companies have started warehousing divisions to provide sorting, kitting (putting pieces together to make up a kit), and cross-docking. Other carriers are adding the third-party logistics divisions to manage a shipper/receiver's transportation and storage activities. Finally, a few trucking companies have started air carriers' divisions, freight-forwarding services, and logistics information services. After considerable thought, Dean decides that the only viable, long-term strategy for Double D is to become a full-service logistics provider. Being only a trucking company will greatly impair the growth and profit potentials of Double D. (Langley & Gibson, 2009).

1.4.6 Business example 2

Thomas Train, vice president of transportation for Specialty Metals Company, a metals servicing company with operations in ten midwestern states, has been soliciting bids for the movement of tool steel. Tom's goal is to reduce the shipping cost of the high-value steel. The supplier is in Weirton, West Virginia, 350 miles from Specialty's Toledo, Ohio, service center. Steel Haulers, Inc, a regional contract motor carrier, currently moves the tool steel under contract. Steel Haulers' current rates are incremental: $2.8/cwt for shipment weighing less than 150 cwt, $ 2.60/cwt for shipment between 150 and 250 cwt. For various equipment, financial, Tom removed all but 2 carrier proposals. One of the two remaining carrier proposals is from Flat-bed, Inc., a contract motor carrier that has an excellent reputation for providing specialized steel hauling service. Flatted submitted a rate of 2.60/ cwt with the minimum weight of 100 cwt, the carrier gives no discount for larger shipments. The second carrier under consideration is the Middle west Railroad, which submitted a piggyback rate of $2.45/cwt with a minimum of 200 cwt, the rate is for Plan 2, door-to-door piggyback service with a maximum shipment weight of 400 cwt per load. Both motor car-riers will provide one-day transit time, while the piggyback transit time is three days.

The final proposal Tome is considering is a private truck submitted by the transportation department. The estimated total operating cost for the private fleet (including overhead and depreciation) is 50,000 per year, the investment the vehicles require is $85,000. This annual operating cost equates to 2.50/cwt with a minimum of 400 cwt per shipment and fifty shipments per year. The private truck proposal recognizes Specialty's inability to provide a load for the backhaul from Toledo to Weirton. But, given today's deregulated environment, the proposal assumes the private fleet will be able to solicit return loads from other Toledo shipper's 30 percent of the time and generate $15,000 in annual backhaul revenue. (Langley & Gibson, 2009)

Tom should consider the final option since he has a contract with the steel mill to purchase two million pounds of tool steel per year. The unloading costs would be the same under this proposal. The inventory-in-transit cost is 15 per cent per year.

Conclusion

All in all, the transportation shows the major cost component of the logistics supply chain, and

it connects the supplier and clients. By improving the quality of the transportation mode or choosing the suitable ones will enable the company to differentiate its product in the marketplace. There are some important types of transportation such as air, land, sea, intermodal, etc., and they have advantages as well as disadvantages. Railroad offer the low cost for the long hauls of large volumes, but they have limited accessibility and long transit time. Air carriers have very low transit times but very high rates. Water transportation has low in term of costs and tend to transport large volumes over long distance but long in transit times and service disruption by weather. Motor carriers or trucks are very accessible and have a high ability to move goods in small quantities with low transit time, but their costs are high.

1.5 The element Return

1.6.1 A theoretical framework

Reverse logistics stands for all the activities that connected to the reuse, recycle of products and materials, or reclamation, refurbishment. (GlobalTranz, 2021). Reverse logistics refer to use again the products after they arrive at the final customers, and it is likely to include how our company products could be reused or recycled and the company should try to use to the expired product to create value. For example, the company provides the home-made orange juice to customers and rather than let the customers throw away the bottles after finishing, the company could take them back and start to recycle again. The customers have to pay for the bottle deposit first and when they return the bottle, they could get their money back. The company could reintegrate them back to the supply chain and use for the next time.

Circular economy

A circular economy is defined as the economic system of closed loops in which raw materials components or products are diminished in term of value as little as possible.
(Circular economy, 2022). Another definition of the circular economy is a systems solution that addresses some challenging threats such as climate change, waste, pollution, and biodiversity loss. (Ellen Macarthur Foundation, 2022)
There are some essential reasons why companies should focus on circular economy which are brand image, new technology, costs saving and profits, competitors or rules of the governments. (Nuil, 2022).

Closed-loop supply chain management system is defined as the design, control and operation of the system with the recovery of value from different types of returns over times to maximize the value creation. (Kumar & Kumar, 2013). In an open-loop in reverse logistics, on the other hand, products are not returned to the original producers. (2008 (Guo & Huang, 2008)

1.6.2 Business example 1

Closed Loop
One of the typical companies which follow the circular economy is the tire manufacturing giant Michelin with the support of Lehigh Technology. Every year over one billion tires are disposed globally and with 50 percent of those tires goes waste. Since 20007, the corporate Michelin used Lehigh Technologies to recover the value in waste tires with its proprietary cryogenic

turbo mill. It means using the cutting-edge technology could help freezing te rubber feedstock and change it into powder. This powder could be continued to use as the raw materials which replaces fossil-fuel derived materials. The company estimated to recycle 100% of their tires by 2048. (Rubicon, 2018). It could benefit the company in many ways which are reducing the costs and increasing the company image. Customers also get the advantage which could be getting the low price for the products.

1.6.3 Business example 2

HP company is leading company in the iconic Silicon Valley which does a significant job of recycling its printing cartridges. This company has sent the paid envelop to the customers to encourage them to drop off their expired cartridges and through their partners such as Walmart and Staples, most cartridges are returned which saved the company over half billion. In fact, the HP printer cartridges and other projects have used about half a PET billion bottles. (Kaye, 2022)

1.6.4 Conclusion

The return part includes the important highlight which are Reverse logistics, circular economy, closed loop and opened loop system and their benefits. It is shown by the two typical business examples which demonstrates some aspects of the theories. It is very important for company to understand clearly the terms and apply them into the reality.

2. Supply chain strategies and strategic choices

A supply chain strategy is a formal approach to manage, control and monitor the network between the organisation and its suppliers. It is very important that a supply chain manager develops these strategy to maximize the value of the supply chain. Those are some strategies which will be covered in this chapter:

1. Lean versus Agile
2. Push versus pull
3. Standardisation, Customization, and Mass customization.
4. Outsourcing versus Offshoring
5. Integration versus collaboration

The future developments of supply chain management will also be covered in this part.

2.1 Lean versus Agile

2.1.1 A theoretical framework of Lean & Agile

Lean management is inspired from Toyota's production system, with the definition of working organization method aimed at improving a company's efficiency, more specifically, the quality and profitability of its output. (Manutan, 2022). Lean production is not only focus on the efficiency of individual machines but on the total flow (Mangan & Lalwani , 2016). The key aspect of lean strategy is to make sure that each stage of the process has added value and steps in the process will be eliminated if it does not have.

Lean production and logistics are concerned with erasing waste in a pull-based value stream of activities with level of production and just-in-time inventory management. There are some

principles of lean which are design value, identify value streams, create flow, establing a pull system and pursuit perfection. (Mangan & Lalwani , 2016)

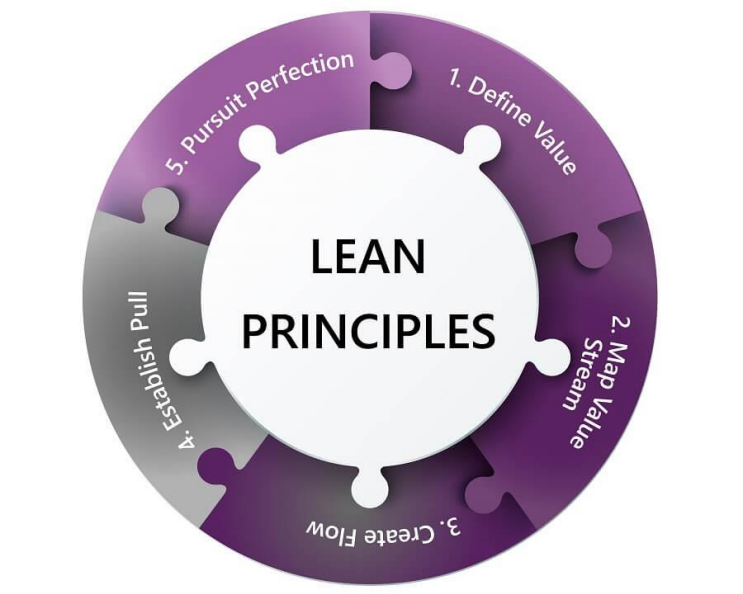

Figure 7: Lean Strategy (Mangan & Lalwani , 2016)

More specific, designing value means specifying what creates value from customers' perspective. The next step is to identify value streams or identify activities that add value or not. The third step is to create flow which means creating and maintaining consistent flow of valuate steps where it is possible. Establishing a pull system is important since it reacts to the customers and only support upon demand. Striving for perfection and having continuous improvements are the last steps. (Mangan & Lalwani , 2016).
There are eight types of waste which are defects, overproduction, waiting, non-utilized talent, transportation, inventory, motion and extra-processing. (Nuil, 2022).

1. Waiting: when the goods are not processed, the waste of waiting occurs. It comes from many reasons such as material flow; production runs are too long and distances between work centers are too great.
2. Transporting: unnecessary movements of products and materials or excessive movement can cause damage and deteriorate the quality of products.
3. Extra-processing: Many organizations put more work or higher quality than the requirement of customers.
4. Inventory: To many inventories could increase lead times, consume productive floor space.
5. Motion: Unnecessary motion of bending, stretching, walking, lifting and reaching could be the problem for organization.
6. Defects: efforts caused by rework, scrap, and incorrect information could have a direct impact to the bottom line and can lead to the huge cost of organization.
7. Overproduction: Production that more than needed or before it is needed.
8. non-utilized talent: Not using people's talent, skills and knowledge in a good way.
(Womack & Roos, 1990)

Womack and Jones developed their own principles of lean consumption which are:

- Response exactly what customers want
- Provide in an exact time
- Provide at exact location
- Solve the customers' problem completely
- Do not waste the customers' time
- Combine the solutions to reduce the customer's time and hassle.

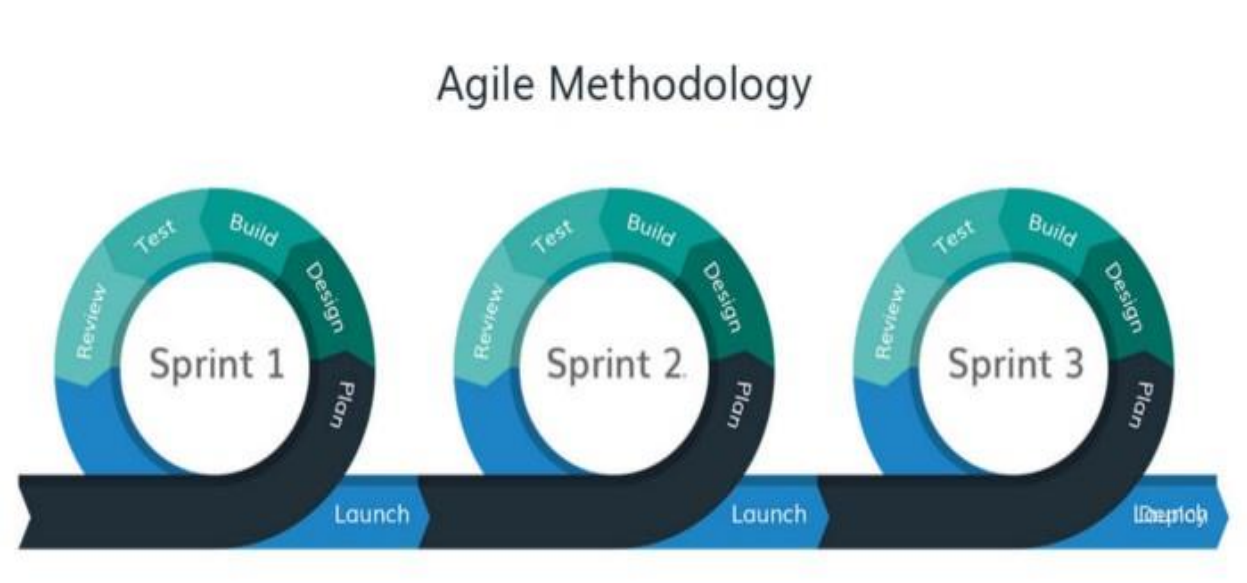

Figure 8: Agile methodology (Nuil, 2022)

Agile is a flexible strategy with short cycles with a result, agile works with visualization and teams with multiple expertise who work independently. (Nuil, 2022). The agile supply chain is a demand-pull chain designed to cope with volatile demand (Nuil, 2022). The agile supply chain is also created to deal with volatility. The agile applies in situations where replenishment lead times are still short but where demand is now unpredictable. It focused on being responsive and flexible to changing customer needs while simultaneously hedging against supply disruption risks. (Kooijman, 2022). An agile supply chain typically results in short order lead time and quick to respond to customers. (NextProcess, 2022).

2.1.2 Business example 1 (Lean)

Lean

Toyota is one of the typical examples which has conducting the successful strategy of lean. The company was founded by Kiichiro Toyada and incorporated on August 28, 1937. It is one of the largest automobile manufacturers in the world, producing about 10 million vehicles per year. Many of its about 1,000 subsidiary companies and affiliates are involved in the production of automobiles parts and commercial and industrial vehicles. The company has production system that helps to maximize production efficiency through the elimination of waste. Toyota production system which helps to spot problems and take prompt to correct fault at any stage in the production process. Machinery will automatically detect an issue and safely stop so that adjustments could be made to eliminate waste. This system also helps to prevent problems

from happening again while maintaining quality and high productivity. They also use lean warehouse operations with TLM and 5S. TLM stands for Toyota Lean management with the purpose to eliminate waste into areas of the business beyond the manufacturing floor. A key component of this management is 5S which are Sort, Set in Order, Shine, Standardize, Sustain. This helps to create workspaces that are free from clutter ton increase productivity, safety, efficiency, and employee satisfaction. (Holland , 2022)

2.1.3 Business example 2 (Agile)

An excellent example is that of Spanish company Zara who have designed a highly responsive supply chain which can translate the latest fashion trends into new products and deliver them to stores within a very short space of time. (Mangan & Lalwani , 2016). Zara is one of the fastest growing clothing companies in the world. They tend of stay close to the latest fashion trends and produce the new versions of clothes in a short time. Zara seems to excess capacity in its manufacturing operations to be able response quickly to unexpected demand.

2.2 Push versus Pull

2.2.1 A theoretical framework of Push and Pull

The next several sections will provide details concerning about supply chain strategies which are push and pull. The theory will be explained first and then the business example will be used to demonstrate or the theory. In this part, the definition of push, pull, decoupling points, advantages as well as disadvantages of push/pull, and “make to stock’’, “make to order”, “assemble to order” will be presented.

In term of pull-based strategy in supply chain, all the activities are demand driven rather than forecast driven. Pull strategy tend to require the producer to have shorter production lead times and access to customers in a short time. A pull strategy also defined as the promotion strategy will focus more on consumers rather than members of a marketing channel. In a push strategy, supplier tend to push their products towards their customers, and in a pull strategy, the company does not have to do that since customers will pull information or products that are met their needs.

A push strategy is defined as a promotion strategy focused on wholesalers and retailers rather than final customers to push the flow of goods from a producer to customers.

(Brocato, 2010). One of the disadvantages of push strategy is if product were built to forecast, the producer would have to build product of conceivable configuration to supply the specific products what they wanted. (Langley & Gibson, 2009). It is very costly and related to mass production which related to high warehouse costs. A pull strategy with CTO (Configuration-to-order) is much more exactly and allow the manufacturer to postpone production until their actual orders are received. There are various benefits from those such as risk reduction, streamlined inventories, increased customer responsiveness. The drawbacks of the pull strategy are long lead time or requires creating a high demand for goods. All in all, the push and pull strategy both have the advantages and disadvantages. As a result, to select the best supply chain strategy, it is suggested that high demand uncertainty should use pull strategy. For example, the computer industry. For the push strategy, the company should use it when it has

high importance of economies of scale as well as low uncertainty. (Nuil, 2022)

Make-to-stock could be considered as overproduction or products ends up being stocked in a warehouse. (Mangan & Lalwani , 2016) which are conversely “make-to-order”. “Make-to-stock” strategy applied to standard items and these items could be produced in advance without customers’ orders and the customers normally engage in the end of the process. (Nuil, 2022).
“Make-to-order” refers to the order scenario production which engages the customers at the beginning of the process and affected the purchase of the raw materials. (Nuil, 2022)
“Assemble to order” is a business production strategy where customers actively order the products and producer manufactures and customize to a certain extent. (Assemble-to-Order, 2021). It is known that customer engagement point is during the assembly of the product. (Nuil, 2022).

The order decoupling point concept

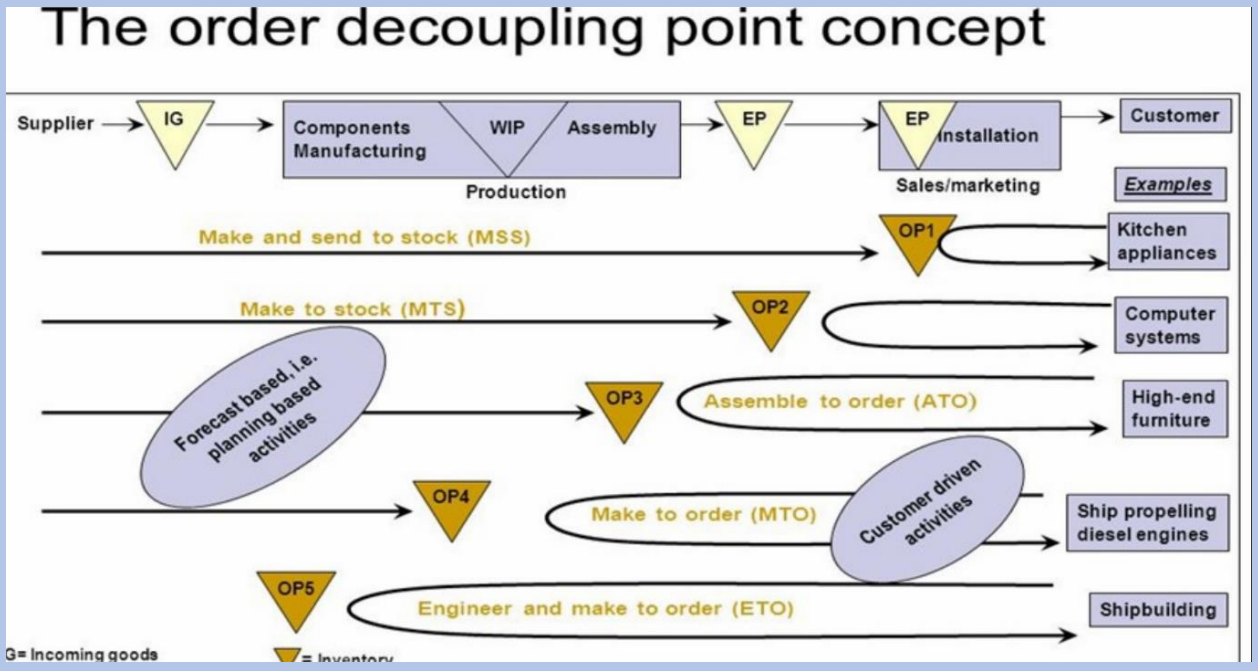

Figure 7: The order decoupling point concept (Nuil, 2022)

The CODP is defined as the specific point in the value chain for a product, where the product is connected to customer order. The CODP is called the order penetration point as well and various manufacturing situations such as make-to-stock, assemble-to-order, make-to-order, and engineer-to-order are all related to different positions of the CODP. (Olhager, 2010)

2.2.2 Business example 1 (Push)

A typical example of push strategy in supply chain management is mobile phones (Nokia). Nokia Corporation is a Finnish multinational telecommunication, information technology, and

consumer electrics company which is founded in 1865. This company uses the push strategy and promote their product via retailers such as Carphone Warehouse. Nokia offers subsidies on the handsets to encourage their retailers to sell the large number of products. The company do the production and supply volumes based on the demand expectation and historical sales numbers. (Flynn, 2020). It could lead to the high cost of transportation and high production of the inventory.

2.2.3 Business example 1 (Pull)

There are some common brands that are successfully used the pull strategy over the years which are Nike, Adidas, Reebok, Louis Vuitton and many others. Adidas is a German-based sports apparel producer and part of the Adidas Group. Besides the sports footwear, the company also manufacturers other goods such as eyewear, clothes, and watchers for sport lover. It is considered to be the largest sportswear producer in Europe and the company revenue for 2008 was around 10.799 billion euro. The history started with Adi Dassler who started to produce his own sports shoes and later his brother also joined the business which became Dassler Brothers Shoe Factory. They started to use the pedal power from a stationary bicycle to run their equipment since they do not have the electricity supplies at that time. Adi Dassler persuaded the United States sprinter Jesse Owens to use the shoes who is the first sponsorship for an African American. Business was successful and he were selling 200,000 pairs of shoes each year before World War 2. The company has been doing the excellent supply chain management which integrate of key business processes across the supply chain for adding the value to customers and stakeholders. It has used the pull strategy which helps the company gets low expense as well as decreased in inventory holding costs. In addition, the company strive to focus on main competencies and becoming more flexible, they have been conducting reducing their ownership of raw materials sources and distribution channels. They focus on the customer demand and do the production scheduling for each manufacturing facility in the supply chain (minute by minute). (PhD Essay, 2022). There are some benefits which this company gain thanks to use this strategy such as value creation, brand equity creation and customer lifetime value. Sustainable competitive advantage is also the good benefit from this one.

2.2.4 Business example 2 (Pull)

Louis Vuitton was founded in 1854 and it first produced trunks, luggage and bags. In 1977, it has 2 stores which was 10million US. The corporate now excels in the production of ready to wear, shoes, watches and jewelry in additional luggage, bags and accessories. It owns 17 production workshops, an international logistics center, and exclusive shops worldwide. It changes their manufacturing process to keep up with the customers' demand and expectations to compete for market share. They pursued the pull strategy which helps the company gain a lot of profits.

2.2.5 Conclusion

From the summary of the pull and push strategy as well as cases, it is concluded that there is no best strategy exactly to implement. It depends on the company strategy and to ensure the sustainability of their business, the company could choose one of two to influence their

customers' buying decisions. Push strategy could help the company to create superior value for OEMs via building the strong relationships with partners and providing them with additional benefits cost savings. In contrast, pull strategy is likely to help the company gain strong brand awareness and brand differentiation.

2.3 Standardization, Customization and Mass customization

2.3.1 A theoretical framework

Another important strategy of the supply chain management are standardization, Customization and Mass customization. In this part, the brief summaries of those strategies are mentioned including the examples.

Mass production is defined as the manufacturing of the large quantities of regulated goods, often using the innovative technology. It helps to increase efficient production of a large number of similar products. (Nuil, 2022). According to Investopedia, mass production is also considered as flow production, repetitive flow production, series production, or serial production. Its purpose is to get the high volume, detailed organization of material flow or division of labor. There are a bunch of advantages if using the mass production such as high level of precise production, lower costs from automation and fewer workers, higher levels of efficiency as well as prompt distribution and marketing of an organization's products. A typical example of mass production is Henry Ford which developed the assembly line technique of mass production in 1913. (Investopedia, 2020). The drawbacks of this mass production are high warehouse costs as well as no attention for individual wishes (Nuil, 2022). An assembly line is defined as a production process that divide the manufacture of a products into steps that are completed in a pre-defined sequence. The mass production tends to apply this process to reduce the labor costs. Mass customization is a process that allow a customer to personalize certain features of a product while holding expenses at or near mass production prices. (Investopedia, 2020). Mass customization could be included made-to-order or built-to-order. There are four primary types of mass production which are collaborative customization, adaptive customization, transparent customization, and cosmetic customization. There are some benefits of mass customization which are related to product differentiation, marketing strategy, competitive advantage as well as brand loyalty. In term of product differentiation, manufacturers could delay the step of product differentiation until the final phase of manufacturing. It allows customers to make decisions and from the customers perspective, it allows them to customize a product that they are favor. It is acknowledged that the company tend to gain the competitive advantage over other company depends on the mass customization. As a result, they will have an opportunity to increase sales, profits and brand loyalty.

2.3.2 Business example 1 (Mass customization)

Nike By You or NikeiD from apparel manufacturer, Nike is an American sportwear company headquartered in Beaverton, Oregon. It was founded in 1964 as Blue-Ribbon Sports by Bill Bowerman. From the late 1980s Nike steadily expanded its business and diversified its product line through numerous acquisitions. It is a perfect example of mass customization in marketing

and manufacturing. More specifically, it allows customers to personalize their own Nike products which included clothing and footwear from materials to colors. The company have allowed the consumers worldwide to personalize items which they prefer to buy in order to meet their expectations and increase their profits. (WallStreetMojo, 2022)

Other examples could be personalized outfits from Tommy Hilfiger B.V, Custom Lego minifigures, personalized hospitality services from Rits-Carlton or clean solutions from Cham Station. (WallStreetMojo, 2022).

2.3.3 Business example 2 (Mass customization)

Dell is one of the computer technologies which maintains a close relationship with its customers and suppliers. It collects personalization information from customers via the internet and allows them to select their preferred configurations online. After that, it customizes and assembles parts instantly. Thanks to its modularity and web-based features for order processing, Dell successfully implements made-to-order. (WallStreetMojo, 2022). The benefits of the mass customization strategy are to allow Dell customers to choose a range of colors, structures, patterns, and improve brand image. It also ensures timely delivery using existing equipment and technologies, as well as programs and procedures.

2.3.4 Comparison/Conclusion

In conclusion, build-to-order or mass customization is the cost-effective and large-scale production of custom-made products. In built-to-order, demand is of fragmented type, compared to the mass production, consumption is stable. Customers' needs are identical in bulk production; however, they are distinct in made-to-order. It is recommended for the companies to choose mass production or made-to-order since it is expensive to spend on technologies for customization.

2.4 Strategic choice of outsourcing versus offshoring

2.4.1 A theoretical framework

Outsourcing is defined as the transfer to a third party of the management and delivery of a process previously performed by the company itself. According to Langley (2009), third-party logistics firm is the external supplier that do all or part of a company's logistics functions. (Langley & Gibson, 2009). There are some types of third-party logistics providers which are transportation based, warehouse/ distribution based/ Forwarder based/ Financial based/ Information based. There are some advantages and disadvantages of using the outsourcing method. The first benefit could be the company could focus on their main activities and another projects. Saving costs could be mentioned since the third-party company knows what they are doing, involving in the data collection for a large number of clients. A third party can step away from the company's regulations and highlight the benefits of improved the company system. (Marc & Buhovac , 2022). Some other reasons for using outsourcing could be to gain customer service improvements, gain access to global capability or benefit from economies of

scale, etc. (O' Byrne, 2022).

The disadvantages could be dependance of a third party or loss of knowledge as well as flexibility. (Nuil, 2022). Another reason why many company do not want to use the third party is that they believe the company can perform internally at least effectively as would be expected of a 3 PL. (Langley & Gibson, 2009).

Offshoring is defined as the transfer of process to lower cost locations in other countries. Moreover, the location is still part of the main company. According to the Ttec (2022), offshoring is described as the ownership of a complete business to a different country where the company receiving the services is located. (Ttec, 2022). There are some advantages and disadvantages of offshoring such as saving costs and lack of control. (Nuil, 2022).

2.4.2 Business example 1 (outsourcing)

There are many companies offering those services which are Agility, Inc, Uti Worldwide, Caterpillar Logistics, Schneider Logistics, Penske Logistics, Menlo Logistics, DHL- Excel, Ryder, IBM Management Services, FedEx Supply chain management services, UPS Supply chain solutions. Examples of leading logistics service providers: DHL (1969), is one of the first air courier companies that has products delivering from San Francisco to Honolulu. Theseday, the Deutsche Post World Net owned the company 100% and it has now 490,000 employees present in more than 220 countries and territories. (DHL, 2020)Another biggest company is Kuehne + Nagel which is founded in 1890, now it has more than 63,000 employees. It based on the Germany and has evolved to become the full service 3PL. (Kuehne+Nagel, 2022).

One of the users of 3 PL is Danone Waters UK & Ireland, a subsidiary of the French-based multinational Groupe Danone, has chosen Schneider Logistics as its leads logistics provider to move the bottled waters. Danone Water has already supplied more than 450 thousand tons annually of bottled waters. They will cooperate to work together, and Schneider Logistics will be responsible for delivery to customers from Danone Water’s warehouses, auditing and paying freight invoices and selecting and managing haulers. (Supply & Demand chain Executive , 2005).

2.4.3 Business example 2 (offshoring)

WhatsApp was launched in 2009 and the company offshore its software development to Eastern Europe. WhatsApp was founded by Jan Koum and Brian Acton who had previously spent 20 years combined at Yahoo. WhatsApp joined Facebook in 2014 but continues to operate a different app with the purpose to build a messaging service that works fast in the world. The client application was created by WhatsApp of Mountain View, California and it has more than 2 billion users worldwide by February 2020. (Alcor, 2021)
The company relied on the offshore talent to keep the backstage, providing design solutions as

well as developing the core app and their in-home engineers concentrated on client-related tasks such as customer support. WhatsApp relied on offshore talent in keeping the backstage, providing design solutions, and taking care of core app development. Now their app went on top of the Appstore and Google Play. Thanks to the offshoring, the practice of outsourcing operations overseas, with the intention of reducing the cost of doing business, WhatsApp can take advantage of other resources, cost savings, tax & tariffs and Greater Availability. It also helps Business growth, Profitability and Flexibility.

2.4.4 Conclusion

In conclusion, the users nowadays can use 3PL service such as transportation, warehousing, customs clearance, and brokerage, and forwarding. They could do the outsourcing or offshoring based on the advantages and disadvantages of each type. Approximately two-third companies suggest 3PL involvement in their activities. Although there are a bunch of customers show the satisfaction with outsourcing and offshoring, there are no shortage of suggestions for improvement. The two examples have shown the two successful relationships of the company and outsourcing/ offshoring activities. It means that they are considering these strategies as keys to their supply chain success.

2.5 Strategic choice of integration versus collaboration

2.5.1 A theoretical framework

The basic terms in supply chain are “vertical” and “horizontal”, it is called “supply chain collaboration” in general as useful to achieve of long-term supply chain objectives. (Langley & Gibson, 2009). **Vertical collaboration** is the cooperation when two or more organizations from different levels or stages sharing their resources, performance information or responsibilities in supply chain in order to serve relatively similar end customers. **Horizonal collaboration** is an inter-organizational relationship between two or more companies at the same level or stage in the supply chain to allow greater ease of work and cooperation towards achieving a common objective. (Nuil, 2022)

Supply chain integration includes Forward integration, backward integration, forward and backward integration. (Nuil, 2022). Forward integration is a business strategy whereby the company owns and controls business activities that are ahead in the value chain of its industry, this might include among others direct distribution or supply chain of the company’s products. (Nuil, 2022). Backward integration is a business strategy in which a company expands its role to fulfil tasks formerly completed by businesses up the supply chain. (Romney & Steinbart, 2006)

2.5.2 Business example 1 (forward integration)

One of the examples of forward integration could be the furniture store, which has its own manufacturing, control over the distribution and retailer. The owner decided to cut out the

middleman which makes them be easily offer a product with eh brand name and much lower price. Comparing to the retailers, customers could get directly from this store the wider range of products at the best price. (Studious guy , 2022)This example could relate to the pull strategy. Many giant corporations such as Apple or Microsoft are also using this strategy. They have used the forward integration to increase the power and ownership over the forwards of their value chain. Apple extends to the next levels of the supply chain in an effect to synergize the operations, reduce total expenses, and become more closer to the end consumer in the value chain. (Supply chain secrets, 2016)

2.5.3 Business example 2 (backward integration)

Netflix, Inc. was founded in 1997 and is an American subscription streaming service and production company. It was founded by two serial entrepreneurs, Marc Randolph and Reed Hastings. The company began out in Scotts Valley, California and it has grown to become one of the world's leading internet entertainment platforms. Their main idea is to entertain the world and the company nowadays give access to best-in-class TV shows, movies, and documentaries. These days, they are a subscription-based business model making money with three simple plans: basic, standard, and premium, giving access to stream series, movies, and shows. At the beginning, Netflix started with renting DVDs via mail service and then the company shifted to deliver on-demand entertainment globally. The company started to develop their own production and shows the real-world industry. (Rusith, 2021). The company has used the backward integration to expand its role to fulfil tasks formerly completely. In 2007, Netflix introduced streaming media and video on demand. With these features, the company is marked as successful as it prioritizes subscribers' needs. Their success story is to make customers glued to this platform.

2.5.4 Business example 3 (horizontal collaboration)

An example of horizontal collaboration could be the transport firm that finds itself working along with a contract warehousing firm to satisfy the needs of the same customers.
Another example may be the relationship between a third-party logistics provider and a firm in the software or information technology business. (Langley & Gibson, 2009). Horizontal collaboration is between companies in the same industry can achieve higher efficiency levels. The two company (Hershey Co. and the Ferrero Group) in North American have carried out a joint operational plan to collaborate on warehousing, transportation and distribution.

2.5.5 Conclusion

This part covers the theoretical framework about forwards integrations, backward integrations,

horizontal collaboration, and vertical collaboration. The first is that about integration in supply chain and the second is that of supply chain relationship in general, with the focus on types of the relationship. It is recommended to read the framework “Seven Immutable Laws of collaborative logistics functions” to understand the development of effective supply chain relationships.

2.6 The future developments of supply chain management

Elaborate on future developments and use real business examples to make your story clearer. There are some characteristics of the future supply chain which are:
- Customer driven supply chain
- Connected supply chain
- Risk management
- Management complexity
- Technology matters
- Rethinking workforce
- Total cost perspective (Nuil, 2022)

Blockchain in the logistics
Automating commercial Processes in Logistics with Smart Contract.

Figure 8: How smart contracts could work in the logistics industry. (Blockchain in Logistics, 2018)

Another example of smart contracts in the logistics industry is the usage of the digitization of letters of credit (L/C) to accelerate the prepartion and execution of a standard paper-based L/C. This will reduce a few weeks to a few days. (Blockchain in Logistics, 2018)

There are also some technologies which are used today by many companies which are Enterprise resource planning (ERP), Collaborative planning forecasting and replenishment (CPFR), Vendor managed inventory (VMI), Material requirements planning (MRP), Warehouse management systems (WMS), Electronic data change (EDI). The most first popular software is ERP which is used to manage and integrate the important parts of their businesses such as inventory, service, sales, human resources, purchasing, CRM, financials, products, etc. CPFR is a partnership-based approach to managing the buyer/supplier interfaces across the supply chain. (Nuil, 2022). It was developed by the Voluntary Inter industry Commerce solutions (VICS) Association. There are four phases of CPFR in supply chain collaboration such as Strategy &Planning, Demand& Supply chain management, Execution and Analysis. (Supply chain secrets, 2016). According to the Supply chain Secrets, a variety of benefits of using CPFR such as:
Improving accuracy of sales and order forecasts, reduction in inventory levels, greater efficiency in production and manufacturing, more effective mitigation of supply chain risks, etc.

Vendor managed inventory (VMI) is a process through which the suppliers tend to manage the flow of the product into customer's operations. For example, the upstream member (suppliers) will receive the distortion of demand information (known as bullwhip effect) from the downstream member (retail) in a certain limit in vendor managed inventory, stockout situations are less frequent, and inventory-carrying costs are reduced. (SCM DOJO Blog , 2022). There are dual benefits for both suppliers and customers which are data entry reduction, improved speed of the processing, a connected partnership between suppliers and customers, etc.

Material requirement planning (MRP) is an inventory management system that is completely operated digitally through a wide variety of computer-based platforms. It helps to improve the inventory efficiency as well as calculating the quantities of raw material, rescheduling timely deliveries. (CFI, 2015). There are some data entries which needs to be used in the material requirement planning such as End items, Quantity, Shelf life, Bill of materials, Planning data, Inventory records. (CFI, 2015).

A warehouse management system (WMS) is software application that helps manage the operations of a warehouse or distribution center (DC) from the time goods or materials enter a warehouse until they move out. Operation in a warehouse include inventory management, picking process and auditing. (Gather peer insights , 2022)

Electrotonic data change (EDI) is the computer-to-computer exchange of business documents in a standard electronic format between business partners. (Nuil, 2022). This is how EDI process looks like, no humans or papers involved:

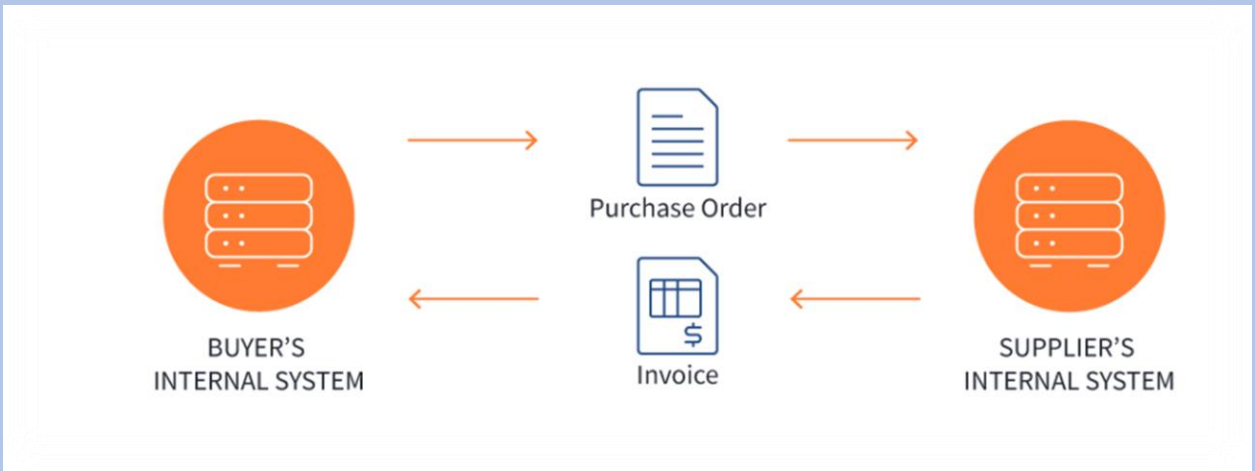

Figure 9: The EDI process (EDI basics, n.d.)

3 Supply chain qualifications, vulnerability and risk

3.1 Supply chain qualifications

3.1.1 A theoretical framework

Total quality management (TQM) is defined as the continual process of investigating and getting rid of errors in producing, streaming supply chain management with the purpose of improving the customer experience as well as making sure that employee's quality is kept up with training. The total quality management aims to improve the quality of an organization's outputs, including goods or service via the continual improvement of internal practices. (Nuil, 2022). A set of standards for Quality Management System (QMS) is created by the International Organization in 1987. This group of standards was given the numbers 9000, 9001, 9002, 9003, and 9004. (Fredendall, 2000). According to Fredendall (2000), the International Organization for Standardization is based in Geneva, Switzerland with the aim to promote the international trade.

Industry standards is established as being of the required standard or norm in a particular area of business and include the production of the items to an understood norm. (Nuil, 2022).

There are 8 quality management principles which are (CLIPSCFM) Customer focus, leadership, involvement of people, process approach, System approach to management, continual improvement, factual approach to decision making, mutually beneficial supplier relationships. (U.S Food & Drug Administration, 2022)

ISO is an independent, non-governmental international organization with a membership of 164 national standards bodies. It has published 23067 International Standards and related documents, covering almost every industry and impacts everyone, everywhere. For example,

ISO 9000 – Quality management
ISO22000 -Food safety management systems
ISO 14000- Environmental management
ISO 27000- Information security management
ISO 31000- Risk management
ISO 50001- Energy management system
ISO 26000 – Social responsibility.
(Nuil, 2022).

HACCP (Hazard analysis and critical control points) is a systematic approach to the identification, evaluation, and control of food safety hazards. (U.S Food & Drug Administration, 2022). It is an effective and rational means of assuring food safety from harvest to consumption. HACCP system prevents problems from occurring and it has 7 principles:
Principle 1: Conduct a hazard analysis.
Principle 2: Determine the critical control points (CCPs).
Principle 3: Establish critical limits.
Principle 4: Establish monitoring procedures.
Principle 5: Establish corrective actions.
Principle 6: Establish verification procedures.
Principle 7: Establish record-keeping and documentation procedures.
(U.S Food & Drug Administration, 2022).

ADR (Accord relatif au transport international de marchandises Dangereuses par Route) is the pan- European treaty for the international transport of dangerous goods by road. The Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) was under the United Nations Economic Commission for Europe on 30 September 1957. (Unece: Sustainable Development Goals, 2021).

There are some advantages for a company to have a certificate or meet industry standards which are reducing costs, increasing productive and innovative efficiency, anticipating technical requirements. It helps to improve the employees' performance and improving the control over the business, preventing problems from occurring, etc. (BDC, 2022). In addition, some disadvantages for a company to have a certificate, meet industry standards are loss of uniqueness, loss of responsiveness, unsuited to some aspects of business, stifles creativity and response time. (CHRON, 2020).

3.1.2 Business example 1 (TQM)

Mc Donald's is one of the premier franchising companies in the world and it was originally opened in 1940. It was a barbecue restaurant and it started with 2 brothers in California. MacDonald's is well-known for providing the good quality of food across the world. It grows

very strong, especially fast food. They always focus on the continuous improvement such as trained employees, improve product quality, and improve performance and exercise a good strategy for its human resources. They also try to improve the product quality-nutrient and have Supplier Quality Index, in depth quality audit for 2 full days. There are some criticisms that they provide the unhealthy food, so they have been trying to add vegetable offerings new salads, give customers more smart choices. In term of employees, they do the quality circle which is a small group of 6 to 12 employees doing similar work meeting together to identify improvements in their respective work areas. It also helps to reduce the risks of issues.

3.1.3 Business example 1 (Industry standards)

ISO 14001: Specification of Environmental Management Systems.
Hitachi Metals Group is a corporation that meets ISO 140001 certificated. It is a leading IT service specializing in developing and implementing business systems for customers of diverse sectors and sizes. It is a multinational company headquarters are in Tokyo. It starts in 1910 with its founder, Odaira Namihei, operating an electrical repair shop at a copper mine northeast of Tokyo. (Treacy, 2022). In its early years, the company concentrated on the manufacture of heavy electrical equipment and industrial machinery. The company now has ISO 140001 is an internationally agreed standard that sets out the requirements for an environment management system. The company now gains a competitive advantage, and the trust of stakeholders thank to the ISO 14001. It helps increase leadership involvement and engagement of employees. In addition, it improves company reputation and the confidence of stakeholders through strategic communication. Moreover, the company can have better environmental performance of suppliers by integrating them into the organization's business systems.

3.2 Supply chain vulnerability and risk

3.2.1 A theoretical framework

Internal risk

Internal risks are the types of risk that emerges from poor systems or poor performance by employees, internal control systems, that will lead to fraud, or accidents in the production facilities and low-quality products. (Mahaso, 2021)There are also other types of internal risk which are safety issues, recall, leaking information, join the competitor, theft, or corporate scandals. (Nuil, 2022). There are some ways that manages risk in the supply chain from level 1 to level 4. For example:
Level 1: Value stream product and process
Level 2: Asset and infrastructure dependencies
Level 3: Organizations and intra-organizational network power dependencies
Level 4: Social and natural environment.
(Nuil, 2022)
There are some steps to deal with the risks which are deciding what matters most, consulting with skate holders, identifying the risks, analyzing the risks, evaluating the risks, treating risks to your business, and committing to reducing risk. (Australia government , 2021).

External risk

There are some external risks which are mentioned such as Economic risk, Political risk, Natural risk. (Mahaso, 2021). For example, economic risk could be changes in the oil prices, changes in the interest rates, exchange rates, and recession. Political risk could be changes in the political environment in a country. Natural risk are earthquakes, cyclones, veld fires, etc. Some other risks could be accidents, natural disasters, political problems &war, environmental &health crisis, digital attack, economic& Financial crisis, Strikes. (Nuil, 2022).

Risk tends to relate to vulnerability and for the company, before dealing with vulnerabilities, should ask: "What "near misses" have we experienced?" "What known weaknesses do we have?'' and "what has disrupted operations in the past". (Mangan & Lalwani , 2016).

External risks could be happened from interactions between the supply chain and its environment. For example, the disruptions caused by strikes, terrorism, and natural catastrophes. It linked to the environmental causes which is ascribable to external risk. (Supply chain vulnerability, 2002).

Supply chain vulnerability can be defined as 'an exposure to serious disturbance, arising from risks within the supply chain as well as risks external to the supply chain'. (Supply chain vulnerability, 2002).

"Supply-chain vulnerability can be defined as the propensity of risk and risk drivers to exceed risk-mitigating strategies, thereby leading to unfavorable results". (Sharma , Srivastava, Kumar, Jindal, & Gupta, 2021).

3.2.2 Business example 1 (internal risk)

The oil drilling rig Deepwater Horizon which operates in the Macondo Prospect in the Gulf of Mexico, exploded, and sank. It leads to the death of 11 workers and the largest spill of oil in the industry of marine oil drilling operations. It happened on April 20, 2010. It is confirmed that 4 million barrels of oil flowed from the damaged Macondo well over an 87-day period, before it was finally capped in July 2010. The risk could be managed and controlled via a rules-based model and requires alternative approaches. (Unites States Environmental Protection Agency, 2020). The organization should identify and prepare for nonpreventable risks that arise externally to their strategy and operations. U.S District blame BP for the 2010 Gulf of Mexico disaster, 67% of the fault to BP, 30% to Transocean, which owned the Deepwater Hoziron drilling rig, and 3% to Halliburton, the cement contractor (Unites States Environmental Protection Agency, 2020).

3.2.3 Business example 1 (external risk)

Natural risk is considered as the natural disaster which leads to bad consequences of normal business operations. An example of this could be earthquake, typhoons, etc that may affect the

opening of the company, damage to the building and merchandise being sold. A Panasonic Corp factory in northern Japan which inundated by Hagibis, took about 2 months to repair. The Chief Financial Officer Hirokazu Umeda told a news conference last week about the loss of electronics giants' profit. It affects more on the daily activities as well as employees 'life. Japan's Panasonic saw its worst-ever net loss of huge amount for the year, blaming the natural disaster in Japan (Panasonic Industry , 2019). Companies should have insurance to cover the loss or other consequences from natural disaster. Moreover, it is better to locate the company in a good location and avoid the natural disasters. (Reuters survey, 2019).

3.2.4 Conclusion

This part has covered the supply chain vulnerability and risk, internal risk, and external risk and two typical examples to demonstrate the theories. Supply chain vulnerability, risk and the closely related concept of logistics are necessary for company to consider. Now more than even, there are increasingly more risks so the companies which are currently planning to purchase a successful business should have a clear understanding of this field. The final chapter full-length cases as well as useful information for supply chain students to research more in the future.

Bibliography

Brocato, D. (2010). *Wiley Online Library*. Retrieved from Push and Pull Marketing Strategies: https://onlinelibrary.wiley.com/doi/abs/10.1002/9781444316568.wiem01053

DHL. (2020). Retrieved from About DHL: https://www.dhlparcel.nl/en/about-us

Kuehne+Nagel. (2022). Retrieved from About Kuehne+Nagel: https://jobs.kuehne-nagel.com/global/en/about-us

Alcor. (2021). Retrieved from 5 Successful and 4 Bad Offshoring Examples: https://alcor-bpo.com/your-own-rd-office-news/5-successful-and-4-bad-offshoring-examples/

Anaplan. (2022). *Anaplan*. Retrieved from Circle K fuels a better forecast: https://www.anaplan.com/customers/circle-k/

Antonio, T., Scavarda, L., & Fernandez, N. (2012). Sales and operations planning: A research synthesis. *Science Direct* .

APICS Dictionary. (1998). Chicago: Chicago.

Arktransportation. (2022). Retrieved from Built to serve : https://arktransportation.com/

Assemble-to-Order. (2021). Retrieved from Investopedia : https://www.investopedia.com/terms/a/assemble-to-order.asp#:~:text=Assemble%2Dto%2Dorder%20(ATO)%20is%20a%20business%20production,manufactured%20but%20not%20yet%20assembled.

Australia government . (2021). Retrieved from Business. gov.au : https://business.gov.au/risk-management/risk-assessment-and-planning/assess-and-manage-risk

BDC. (2022). Retrieved from Why ISO? 5 key benefits of a quality management system: https://www.bdc.ca/en/articles-tools/operations/iso-other-certifications/iso-advantages-quality-management

(2018). *Blockchain in Logistics.* DHL trend research. Retrieved from Perspectives on the

upcoming impact of blockchain
CAS . (2020). Retrieved from CAS: https://cas-energy.com/new
CFI. (2015). Retrieved from Material Requirements Planning (MRP): https://corporatefinanceinstitute.com/resources/knowledge/other/material-requirements-planning-mrp/
Chopra, S., & Meindl , P. (2000). *Supply chain Management: Strategy, Planning and Operation.* Pearson .
CHRON. (2020). Retrieved from The Disadvantages of a Standardization Business: https://smallbusiness.chron.com/global-standardization-marketing-25939.html
Circular economy. (2022). Retrieved from what is the definition of the circular economy?: https://kenniskaarten.hetgroenebrein.nl/en/knowledge-map-circular-economy/what-is-the-definition-a-circular-economy/
Deloitte. (2022). Retrieved from Supply Planning .
EDI basics. (n.d.). Retrieved from What is EDI (Electronic Data Interchange)?: https://www.edibasics.com/what-is-edi/
EDI basics. (2022). Retrieved from What is EDI (Electronic Data Interchange)?: https://www.edibasics.com/what-is-edi/
Ellen Macarthur Foundation. (2022). Retrieved from Circular economy introduction: https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview
Ferreira, L., & Kharlamov, A. (2012). Application of Kraljic's purchasing portfolio matrix in. *International Conference on Industrial Engineering and Operations Management*.
Flynn, A. (2020). *Which companies use push strategies?* Retrieved from Greedhead: https://greedhead.net/which-companies-use-push-strategies/
Fredendall, L. (2000). *Basics of Supply chain management* . CRC Press.
Gartner Glossary. (2022). Retrieved from Gartner Glossary: https://www.gartner.com/en/information-technology/glossary/scp-supply-chain-planning
Gather peer insights . (2022). Retrieved from Warehouse Management Systems Reviews and Ratings: https://www.gartner.com/reviews/market/warehouse-management-systems
Gattorna, J., & Walters , D. (1996). *Managing the Supply Chain: A strategic Perspective.* London: MacMillan.
GlobalTranz. (2021). Retrieved from What is reverse logistics and how is it different than traditional logistics ?: https://www.globaltranz.com/what-is-reverse-logistics/
Greeff, G., & Ghoshal, R. (2004). *Practical E-manufacturing and Supply Chain Management* .
Guo, Q., & Huang, L. (2008). A joint inventory model for an open loop reverse supply chain. International Journal of Production Economics. *International Journal of Production Economics*.
Hart, M. (2021). *Hubspot*. Retrieved from A Comprehensive Overview of Sales and Operations Planning (S&OP): https://blog.hubspot.com/sales/sales-operations-planning
Holland , T. (2022). *Toyota Forklifts Blog* . Retrieved from What is Toyota Lean Manageement?: https://www.toyotaforklift.com/blog/what-is-toyota-lean-management
Investopedia . (2022). Retrieved from Investopedia : https://www.investopedia.com/terms/s/scm.asp#:~:text=Supply%20chain%20management%20is%20the,competitive%20advantage%20in%20the%20marketplace.
Investopedia. (2020). Retrieved from Mass production: https://www.investopedia.com/terms/m/mass-production.asp
Jenkins, A. (2020). *Oracle Netsuite*. Retrieved from Oracle Netsuite: https://www.netsuite.com/portal/resource/articles/erp/demand-planning.shtml
Kaye, L. (2022). *3 Great Open Loop Recycling Projects*. Retrieved from Triple Pundit:

https://www.triplepundit.com/story/2013/3-great-open-loop-recycling-projects/53196
Kilger, C., & Wagner, M. (2013). *Supply Chain Management and Advanced Planning* .
Kiran , D. (2019). *Production Planning and Control.* Elsevier Inc.
Kooijman, B. (2022). *Agile Scrum Group* . Retrieved from What is an Agile Supply Chain?: https://agilescrumgroup.nl/agile-supply-chain/
Kumar, R., & Kumar, S. (2013). International Journal of Engineering Research and Technology. *Closed Loop Supply Chain Management and Reverse*.
Langley, J., & Gibson, B. (2009). *Managing supply chain.* Canada: Cengage Learning .
Mahaso, U. (2021). *Theron Group Blog* . Retrieved from Internal risk vs External risk : https://blog.therongroup.org/internal-risk-vs-external-risk/
Mangan , J., & Lalwani , C. (2016). *Global logistics and supply chain management* . TJ International, Padstow, Cornwall.
Manutan. (2022). Retrieved from Definition, tools and advantages of Lean Management: https://www.manutan.com/blog/en/glossary/lean-management-definition-and-tools
Marc , E., & Buhovac , A. (2022). *Make sustainability work.*
MBA Skool. (2016, 3 29). Retrieved from MBA Skool: https://www.mbaskool.com/business-concepts/operations-logistics-supply-chain-terms/15951-distribution-planning.html#:~:text=Distribution%20Planning%20is%20a%20systematic,location%20in%20the%20desired%20time.
NextProcess. (2022). Retrieved from Lean&Agile: Understanding Supply Chain Management Strategies and Finding one that works for your business: https://www.nextprocess.com/procurement-solutions/lean-vs-agile-understanding-supply-chain-management-strategies/
Nuil, M. v. (2022). *Supply chain management lectures.*
O' Byrne, R. (2022). *What is outsourcing ?* https://www.logisticsbureau.com/what-is-outsourcing/.
Olhager, J. (2010). *The role of the customer order decoupling point in production and supply chain management*. Retrieved from The research gate : The role of the customer order decoupling point in production and supply chain management
Panasonic Industry . (2019). Retrieved from Current damage report and recovery status at Panasonic Koriyama plant due to Typhoon Hagibis: https://industrial.panasonic.com/ww/electronic-materials/news/koriyama-recovery
PhD Essay. (2022). Retrieved from Case Study on Adidas Supply Chain: https://phdessay.com/case-study-on-adidas-supply-chain/
Ponties , N. (2021). *What is barcode*. Retrieved from Camcode: https://www.camcode.com/blog/what-is-barcoding/
Reuters survey. (2019). Retrieved from Most Japan firms affected by typhoons, want Abe govt. to spend more: Reuters survey: https://www.reuters.com/article/us-japan-companies-poll-idUSKBN1XH2XR
Romney, M., & Steinbart, P. (2006). *Accounting Information System* . Pearson education.
Rubicon. (2018). Retrieved from 10 Companies Closing the Loop On The Circular Economy: https://www.rubicon.com/blog/10-circular-economy-companies/
Rusith. (2021). *Learn Business Concept*. Retrieved from Understanding Backward Integration – with Real Industry Examples: https://learnbusinessconcepts.com/understanding-backward-integration/
SCM DOJO Blog . (2022). Retrieved from Vendor Managed Inventory : A Step-by-Step Guide, Benefits and Risks: https://www.scmdojo.com/vendor-managed-inventory/
Sharma , S., Srivastava, P., Kumar, A., Jindal, A., & Gupta, S. (2021). *Springer Link*. Retrieved from Supply chain vulnerability assessment for manufacturing industry:

https://link.springer.com/article/10.1007/s10479-021-04155-4#:~:text=Supply%2Dchain%20vulnerability%20can%20be,Wagner%20%26%20Bode%2C%202006).

Studious guy . (2022). Retrieved from Backward and Forward Intergration : https://studiousguy.com/backward-and-forward-integration/

Supply & Demand chain Executive . (2005). Retrieved from Schneider Logistics to Manage Danone Waters UK Movements: https://www.sdcexec.com/sourcing-procurement/news/10356859/schneider-logistics-schneider-logistics-to-manage-danone-waters-uk-movements

Supply chain secrets. (2016). Retrieved from An introduction to CPER in Supply chain: https://www.supplychainsecrets.com/an-introduction-to-cpfr-in-the-supply-chain/

(2002). *Supply chain vulnerability.* Cranfield University: School of Management.

Treacy, E. (2022). *Hitachi, Ltd*. Retrieved from Japanese manufacturer: https://www.britannica.com/topic/Hitachi-Ltd

Ttec. (2022). Retrieved from Logistics Bureau : https://www.ttec.com/glossary/offshoring

U.S Food & Drug Administration. (2022). Retrieved from HACCP Principles & Application Guidelines: https://www.fda.gov/food/hazard-analysis-critical-control-point-haccp/haccp-principles-application-guidelines#defs

Unece: Sustainable Development Goals. (2021). Retrieved from About the ADR: https://unece.org/about-adr

Unites States Environmental Protection Agency. (2020). Retrieved from Deepwater Horizon – BP Gulf of Mexico Oil Spill: https://www.epa.gov/enforcement/deepwater-horizon-bp-gulf-mexico-oil-spill#:~:text=On%20April%2020%2C%202010%2C%20the,of%20marine%20oil%20drilling%20operations.

WallStreetMojo. (2022). Retrieved from Mass Customization : https://www.wallstreetmojo.com/mass-customization/#:~:text=Mass%20customization%20or%20made%2Dto,at%20a%20relatively%20low%20cost.&text=Nike%20By%20You%20or%20NikeiD,customization%20in%20marketing%20and%20manufacturing.

Womack, J., & Roos, D. (1990). *The machine that changed the world.*