

Seminar Work

Topic: Identification of WST and SCM, LEAN principles in Supply chain of Apple Inc.

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1. Introduction

Apple Inc., formerly Apple Computer, Inc. was founded by Steve Jobs, Steve Wozniak, and Ronald Wayne on April 1, 1976. Apple Inc. designs, manufactures, and sells mobile and media devices, personal computers and portable digital music players, and wide range of related software and services. Apple sells its products worldwide through its retail stores, online stores, and direct sales force, as well as through third-party retailers. Apple has a formidable competition within well established and well financed companies such as Alphabet, Samsung, Amazon, HP as well as newcomers from China like Huawei and Xiaomi.

Objective of Term Paper

In the term paper, we elaborated the process on Identification of Wholeness System Thinking (WST), Principles of Supply Chain Management (SCM) and Lean Principles practised in the supply chain of Apple. We explained below in detail about what WST and their elements of Wholeness System Thinking and how WST can be incorporated with Apple.inc.

Further we explained more about the management of supply chain in Apple and what makes Apple's Supply chain unique in their way of process optimization, Supply chain principles acts upon and what are the impacts on Apple.inc based upon these principles. Also, we were about to brief the explanation of Lean management and their principles of Lean Management implemented by Apple, the effects of Lean principles on Apple. Apple has to say about 'Zero defects', what is "Pull Strategy" and how does it impact on the change in Apple's work strategies, 'One piece Flow', "TAKT time", how is it calculated and the importance of calculating TAKT time.

Today Apple Inc. is a world leader in innovation, product design and development, branding, marketing, and software ecosystems. Its products and services include iPhone, iPad, iPod, Mac, Apple TV, Apple Watch, a portfolio of software applications, Operating Systems, iCloud, accessories, service, and support offerings. They sell products through their retail stores, online stores, direct sales force, third-party cellular network carriers, wholesalers, and retailers. They also sell digital content and apps through the iTunes Store, iBook's Store, and Mac App Store Apple Inc. which has evolved over the years, from its humble beginnings of products being assembled in Steve Jobs garage to the "World's Most Valuable Brand ", worth more than \$2 trillion today. Last year alone Apple reached \$274.515 billion in revenues under Cook's leadership. Much of Apple's recent success is attributed to Cook streamlining its supply chain by outsourcing manufacturing and helping the company to reduce inventory levels.

2. Wholeness System Thinking

Apple Inc are looking for something that even almost all the companies are looking for something new and adaptable to create value for themselves and the customers in this Industrial evolution. The wholeness System thinking is the understanding role and importance of purpose in a system pyramid hierarchy.

2.1 Wholeness System Thinking – Definition and Explanation

“Wholeness is defined as the state of forming a complete and harmonious whole, a unity in other words. Therefore, the System Thinking approach, defining the relation between the system’s elements, and implementing the role of the superior system/external environment for the performance of the system’s elements (purpose, parts, and interactions) and the system is defined as WST”.

Whole Systems Thinking is a method to understand how things (elements and systems) are related, and how they influence one another within a whole.

The WST approach identifies the new role of a system’s purpose, deriving the performance of the selected system’s parts and interactions. Furthermore, the WST approach defines the properties of the selected system’s purpose as derived from the superior system.

2.2 Wholeness System Analysis and Wholeness System Synthesis

“Wholeness System=Wholeness Analysis + Wholeness Synthesis”

Wholeness Analysis

The way of thinking by researching the properties of the parts and its interaction with the external environment is called wholeness analysis. The system’s properties which none of its parts are derived from the interactions of its parts.

Understanding the parts that takes separately such as Fulfilment centres, Manufacturing Hub, Distribution centres, Assembly, Sortation, Customer, Delivery.

Finally, aggregate understanding of the part to the point of understanding as a whole (Supply chain and external environment).

The performance of the wholeness analysis is defined in three steps:

- Taking a studied system apart (parts, and interactions) from the purpose perspective (as defined by WS).
- Understanding each part taken separately.
- Aggregating understanding of the parts and interactions into understanding of the whole system.

Wholeness Synthesis

The way of thinking describes the properties of the whole system is called wholeness synthesis. Properties of the whole system are derived from the upper system which is the part of examined system.

Identifying the role of function performed of the examined system in superior system and identifying the purpose of the studied system in the superior system.

The performance of a system's purpose is derived from the superior system and is defined in three steps:

- Identification of the superior system.
- Understanding the superior system.
- Identifying the purpose of the studied system in the superior system.

2.3. Elements of Wholeness System Thinking (Pyramid)

- Studied System (Lower Triangle)
- Superior System (Upper Triangle)

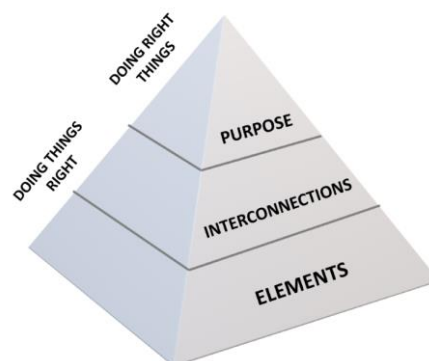


Figure 1 : Wholeness Synthesis

The common segregation of both systems into three divisions are:

1. Doing things right - Elements/Parts are the lowest and the basic components of the system.
2. Doing things right - Interactions serves the core attributes/factors of the system.
3. Doing right things - Purpose are the higher concepts and needs driven by the Superior System.

2.4. Wholeness System Thinking Pyramid of Apple.inc

- Studied System (Lower triangle): The Company - Apple
- Superior system (Upper triangle): The end customers or the users.

Parts: Warehouses, Logistics, Procurement, Distribution centers.

Interaction: Technology, Strategies, Transshipment process, Road map, Information flow.

Purpose: Earn profit of the organization by producing and selling the finished products like iPhone, Mac, iPad.

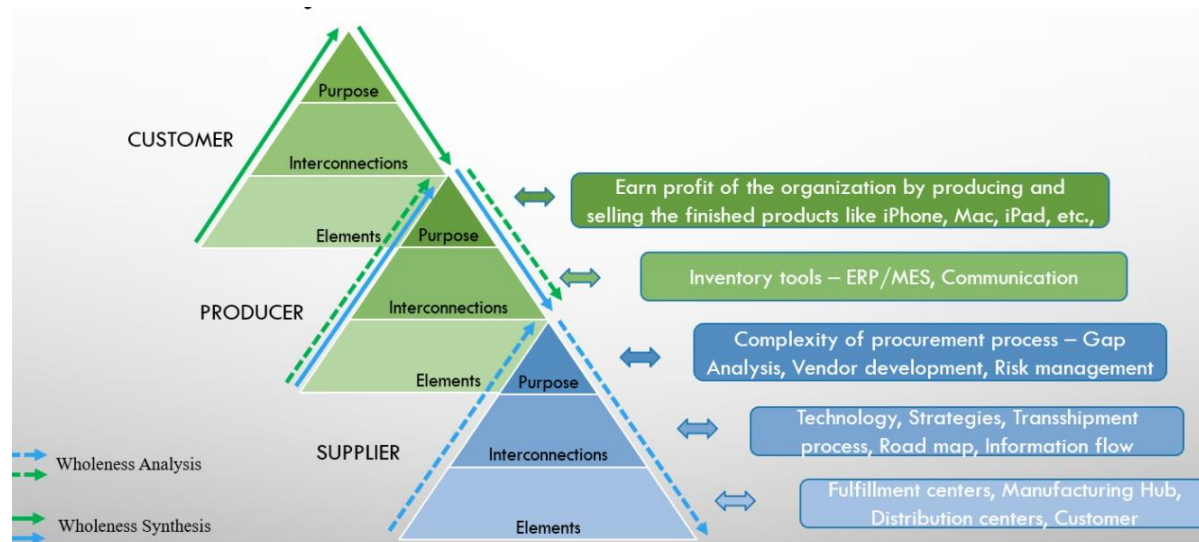


Figure 2 : Wholeness System Thinking Pyramid of Apple, Inc

3. Principles of Supply Chain Management

Supply chain principle refers to the processes that are involved in moving the products from the supplier to consumers. It is a network of organizations, people, resources, activities, and information involved in upstream and downstream. Supply chain management (SCM) is the process of handling the flow of goods or services. The activities involved from acquiring raw materials to the final delivery of the product to consumers come under SCM. Supply chain management minimize the waste, cost and time consumed in the production process.

3.1. The Six Supply chain principles used in Apple are as follows:

1. Integration
2. Management of processes
3. Added Value
4. Push vs Pull principle
5. Bullwhip effect
6. Decoupling point

3.1.1. Integration

Supply chain integration is a process where the all the parties involved with the fulfillment of a product are integrated into a single system. This requires significant coordination and alignment to ensure everyone is always effectively working toward the same goal. Having the parts required for a product show up where they are needed, when they are needed, helps to not only prevent delays in the manufacturing process, but also eliminates a lot of wasted time, storage space, and more. When done properly, supply chain integration will bring parties that are often at odds together with a single focus. All the materials and components from along the supply chain are needed, and by integrating everything into a single system, it is much easier for effective product creation.

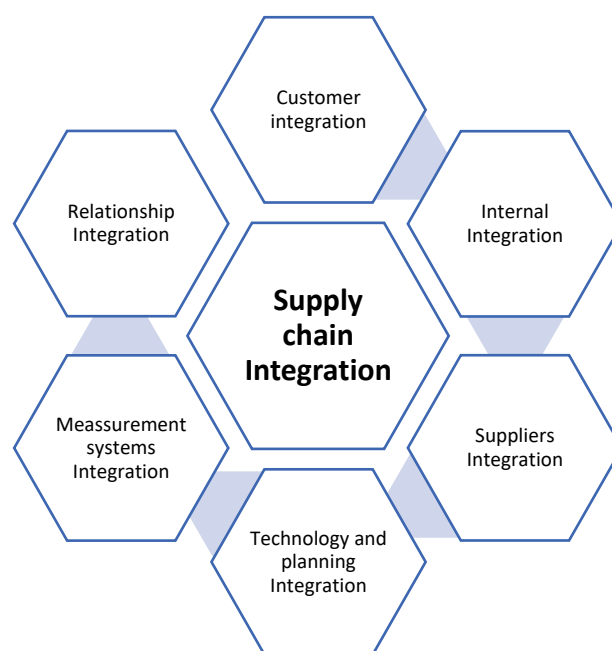


Figure 3 : Supply chain Integration

Horizontal integration: In a horizontal integration, a company takes over another that operates at the same level of the value chain in an industry.

Vertical integration: A vertical integration, on the other hand, involves the acquisition of business operations within the same production vertical.

In technology, Apple for 35 years has championed a vertical model, which features an integrated hardware and software approach. For instance, the iPhone and iPad have hardware and software designed by Apple, which also designed its own processors for the devices. This integration has allowed Apple to set the pace for mobile computing. Apple's integration efforts were on display when the company unveiled its third-generation iPad. The new version come with 4G connectivity, a high-definition display and a faster processor.

3.1.2. Management of processes

Apple had proposed about \$3.8 billion worth joint investment with Samsung Electronics in the production lines of flash chips to be used in the iPod Nano players. It should be noted that almost all other Mp3 players in the market also depend on flash chips for memory, and by trying to enter a restrictive and long-term deal with Samsung, Apple's strategy in part was to create impediments in the way of other competitors in the market gaining access to flash chips in high quantities. By locking in supplies of flash chips with producer like Samsung, Apple would have benefited in two ways: one by securing the supply chain for its own line of products, and thus assuring that demand would be met. Secondly, by denying the other competitors in the market the chance to compete on an equal footing by denying them access to equipment parts that goes into production. Supply chain professionals are trained to share data with trading partners to avoid the unnecessary stock. The demand data must be used wisely by the SCM managers.

The integration of iPod, iTunes and iTunes Store revolutionized music industry. However, Apple was afraid that someone would add music players in phone's handset, then, they decided to discontinue the sales of iPod and created the iPhone. Radical change or "Reengineering" may be necessary if external forces are strong. These are the three-methods apple used to align demand planning.

1. Exponential Smoothing: A weighted averaging method based on previous forecast plus a percentage of the forecast error. Since we are dealing with a time series of data, exponential smoothing is the appropriated technique which focuses on more recent data rather than older data.
2. Discussion & Analysis: Growth stage based on sales record Apple Inc. broke during its first weekend selling 9 million units.
3. Through forecasting, Apple has a better chance at determining where the iPhone will be headed in concerns to sales in the upcoming year. These forecasting numbers not only help predict how much they will sell, but they also open the idea to Apple that they need to bring something new to the consumers.

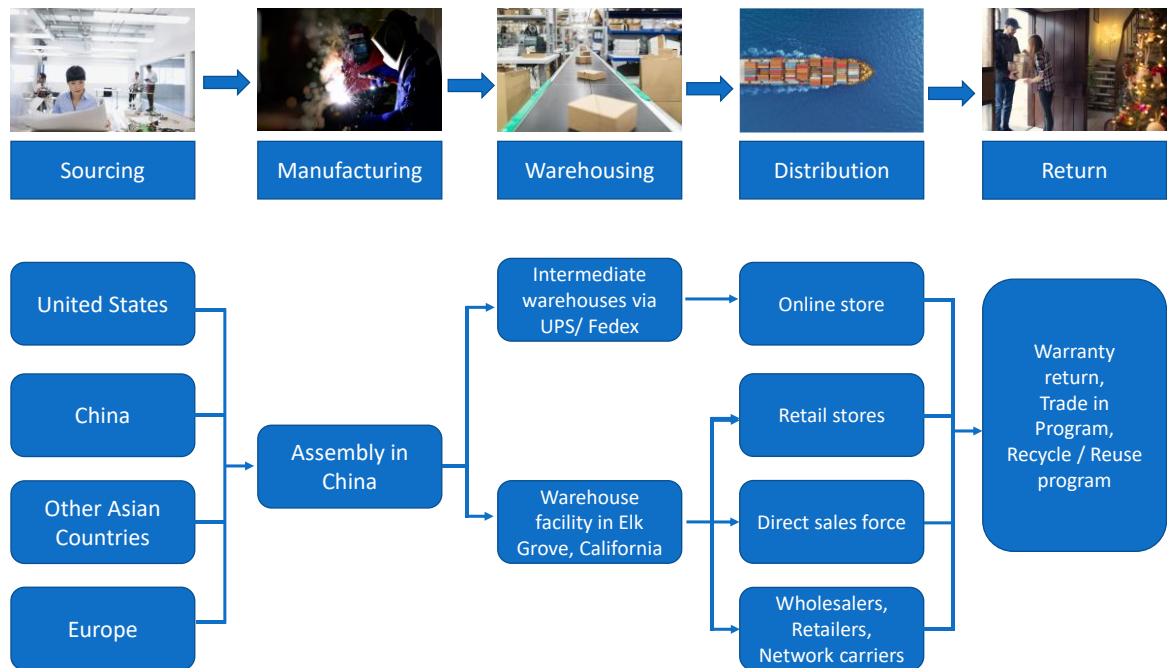


Figure 4 : Management of processes

3.1.3. Added Value

The main sources of value in Apple inbound logistics relate to the economies of scale due to the massive scope and scale of business operations as discussed below and the development of strategic relationships with suppliers. Moreover, Apple Inc. exercises an immense bargaining power in dealing with its suppliers and as a result, the company is able to secure cost advantage in the purchase of resources. A greater level of market penetration into Asia in general and China in particular can be specified as an additional source of value for Apple Inc. from outbound logistics point of view. This is because selling in this particular geographical market would not involve massive outbound logistics expenses and this cost advantage can be passed to customers to increase the overall appeal of offers.⁸

3.1.4. Push vs Pull principle

A push strategy is to push a product at a customer, while a pull strategy pulls a customer towards a product. Push strategy is a quick way to move a customer from awareness to purchase, while pull strategy is about creating an ongoing relationship with the brand. Both serve a purpose in moving the customer along the journey from awareness to purchase, however pull strategies tend to be more successful at building brand ambassadors. Apple had been following a product strategy that can be thought of as a pull system. The company was most aggressive with the products capable of making technology more relevant and personal. The order in which these products were attached to the rope was determined by the degree to which technology was made more personal via new workflows and processes for getting work done. Accordingly, Apple Watch and iPhone were located on the end of the rope held

by Apple management. Meanwhile, Mac desktops were located at the other end of the rope while iPads and Mac portables were somewhere in the middle. As Apple management pulled on the rope, the Apple Watch and iPhone received much of the attention while the Mac increasingly resembled dead weight. Apple no longer appears to be relying so much on a pull system when it comes to advancing its product line.

Instead, a push system is being utilized, and every major product category is being pushed forward simultaneously. The change was designed to reduce the amount of chaos found at the end of the “rope” that Apple was pulling. Accordingly, the primary benefactors arising from this new strategy are the iPad and Mac. A push strategy is when a company “pushes” the products on you with the product placement, shelf placement, and stores they are in. In any store that sells apple products, they are generally grouped together in a premium location. Stores know that with the grouping of the products in one area, with the logo near, consumers will be drawn to this location. A pull strategy is when a company “pulls” the products through the distribution channels such as advertising. Apple still uses advertisements like it did when they first became a company. All of their advertisements focus on Apple’s products, not comparing to their competitors.

Overall Apple uses many different strategies to retain their consumers. Whether consumers are reached through the push strategy or pull strategy, Apple continues to retain and gain a large share of consumers. Any new business should take a look at Apple’s strategies to learn how to efficiently communicate and relate to their consumers.

3.1.5. Bullwhip effect

The bullwhip effect can be explained as an occurrence detected by the supply chain where orders sent to the manufacturer and supplier create larger variance than the sales to the end customer. These irregular orders in the lower part of the supply chain develop to be more distinct higher up in the supply chain. This variance can interrupt the smoothness of the supply chain process as each link in the supply chain will over or underestimate the product demand resulting in exaggerated fluctuations. Apple implemented these strategies to tackle the Bullwhip effect:

- They implemented the first companywide usage of Universal Product Bar Codes where store level information was immediately collected and analysed to tackle the bullwhip effect.
- The use of aggregated demand for the generic product which is much more accurate than the demand for the differentiated products.
- Proper forecasting of the materials according to the customer demands.

3.1.6. Decoupling point

The decoupling point is a standard term given to the position in the material pipeline where the product flow changes from “Push” to “Pull”. It should therefore also correspond to the Demand Penetration Point. *“The point in the product axis to which the customer’s order*

penetrates. It is where order driven, and the forecast driven activities meet. As a rule, the Decoupling point coincides with an important stock point – in control terms a main stock point from which the customer has to be supplied.”

The decoupling point of Apple is distribution centers. In order to respond with high uncertainty demand and availability of products, Apple is having distribution centre as a storage facility, multi-tier inventory management, highly efficiency transportation and implement information systems in California to provide real time Information within its supply chain.

3.2 Seven Supply Chain Lessons of Apple

3.2.1 Customer comes first, cost cutting comes second

The philosophy of product development at Apple is to build "insanely great" products that customer wants to buy. And when the supply chain takes actions in sync with this strategy, the success is outstanding. During 1983 to 1993 when Jobs was not in the responsibility, the cost reduction and profit maximization was the primary strategy which resulted in the spiral down of the company .

3.2.2 Set impossible target

when Jobs decided to change face of iPhone to scratch proof glass, he asked to Corning, who developed the technology called "Gorilla Glass" but it's just prototype in R&D lab. But Jobs said clearly that he wanted a major shipment of Gorilla Glass within 6 six weeks. But it was

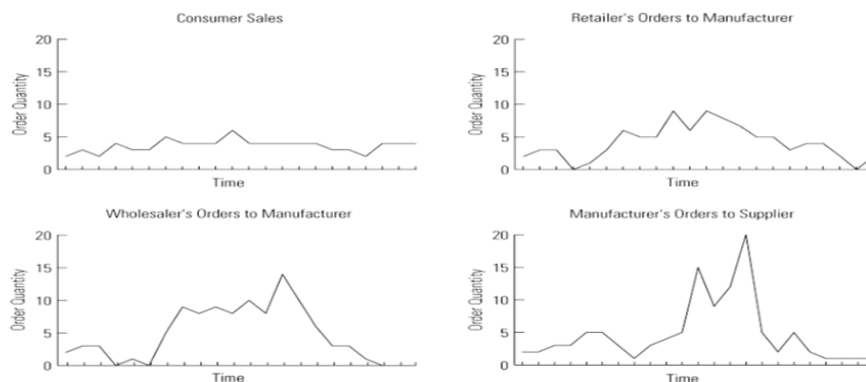


Figure 5 : Increasing Variability of Orders up the supply chain

beyond the capability of Corning. However, Job insisted on this request and later Corning converted one of its LCD production line to produce new kind of glass.

3.2.3 Prioritize action

After Jobs returned to Apple in 1997, there was a wide selection of unrelated product lines. Then, he said that he needed only 4 product categories, which is "Consumer", "Pro", "Desktop" and "Portable". By segmenting products properly, Jobs reduced the complexity of supply chain, and his team can prioritize actions required to support the strategy.

3.2.4 Adopt process view

Steve Jobs ensured that the performance of microprocessor down to the experience of buying products at its stores was linked together. To do this, Apple increased internal integration by establishing common goal across business units.

3.2.5 Simplify product/process

It said on Apple's first marketing brochure that "Simplicity is the Ultimate Sophistication". In literal meaning, Jobs eliminated unnecessary components which led to the reduction of inventory and smoother production process.

3.2.6 Make radical change when necessary

The integration of iPod, iTunes and iTunes Store, revolutionized music industry. However Jobs was afraid that someone would added music players in phone's handset. Then, he decided to discontinue the sales of iPod and created the iPhone. Radical change or "Reengineering" may be necessary if external forces are strong.

3.2.7 Enhance relationship via face-to-face meeting

Jobs believed that great ideas could not be developed through e-mail. From his experience, he created ideas from long meetings. This lesson works well for both internal and external relationship.

3.3. What Makes Apple's Supply Chain Strategy so good?

Apple Supply Chain has some "hiccups" such as various problems of suppliers in Asia, they are one of the role models in supply chain management. Forecasting demand doesn't come only in the form of what products your customers will buy, but also on what kind of technologies will be in demand for the next coming years, allowing the company to reduce costs with suppliers by placing orders for longer term.

- Apple began innovating on the nitty-gritty details of supply-chain management. For instance, Company ensured the company's blue iMacs made available at Christmas the following year, Jobs paid \$50 million to buy up all the available holiday air freight space.
- Apple reduced the number of warehouses to one central location in California and they drastically cut down its inventory holding cost.
- Synchronizing data between the central warehouse and its own stores and customers, making operations more efficient and cost-effective.
- Apple was the very first to outsource its manufacturing to China. Outsourcing manufacturing and as a result reducing the manufacturing of cycle time.
- Tim Cook - Apple's CEO always consolidates suppliers and follows lean management principles.
- Company extended their credit line to some of its deserving suppliers, a move which was unheard in Supply Chain Industry.
- Reducing the number of key suppliers involved in manufacturing, shipping and storing.

4. The Lean Principle

Apple never claims them to be a Lean company. But Apple has some characteristics of Lean manufacturing process and system. The company maintain oversight in the production and design of its products, making its products stand out from the rest in the build and customer experience. Apple hinges on its manufacturing and supply chain management process, which are not only effective but also cost effective which is bordering on the lean manufacturing and system principle. The major aspects of Lean Principles are removal of waste and reduction of cost. In the Apple way of thinking, customer always comes first. So, they always wanted to make their product in a way customer gets a stand out experience. Now we will have a look at all the 4 lean principles where Apple can be connected.

4.1 Zero Defect

Zero Defects theory ensures that there is no waste existing in a project. Waste refers to all unproductive processes, tools, employees and so on. Anything that is unproductive and does not add value to a project should be eliminated, called the process of elimination of waste. Eliminating waste creates a process of improvement and correspondingly lowers costs. Common with the zero defects theory is the concept of “doing it right the first time” to avoid costly and time-consuming fixes later in the project management process.

The major aim of Zero Defect is to eliminate the waste due to error. Apple invest more effort in the designing phase to avoid bottle neck during production. They try to keep the quality level to achieve zero defect. Even though the apple products are outsourced They do ‘**process engineering and process development**’: Working with the manufacturers to adjust (and innovate when needed) their production processes. It means to prepare the tooling, the testing stations, confirm the process control plan ensure measurements are accurate and precise, training the workforce, and so on.

4.2 PULL vs PUSH

In a pull-based supply chain, procurement, production and distribution are demand-driven rather than to forecast. However, a pull strategy does not always require make to order production. TPM is frequently used as an example of pull production, yet do not typically produce to order. They follow the "supermarket model" where limited inventory is kept on hand and is replenished as it is consumed. In Toyota's case, Kanban Cards are used to signal the need to replenish inventory. In Pull based market strategy, consider the Apple product category being attached to a rope. The order in which these products were attached to the rope was determined by the degree to which technology was made more personal via new workflows and processes for getting work done. Accordingly, Apple Watch and iPhone were located on the end of the rope held by Apple management. Meanwhile, Mac desktops were located at the other end of the rope while iPads and Mac portables were somewhere in the middle. As Apple management pulled on the rope, the Apple Watch and iPhone received much of the attention while the Mac increasingly resembled dead weight.

Apple no longer appears to be relying so much on a pull system when it comes to advancing its product line. Instead, a push system is being utilized, and every major product category is being pushed forward simultaneously. The change was designed to reduce the amount of chaos found at the end of the “rope” that Apple was pulling. Usually, Apple follow the pattern of conducting one single big event for the launch of iPhone during the month of September all the other products are also launched along with the iPhone in the same event. But in the year 2020 Apple changed its strategy to conducting separate events for the launch of each product. This gave a much more audience attraction to the products compared to the previous years.

4.3 One Piece Flow

As “single-piece flow” or “continuous flow,” one-piece flow is a key concept within the Toyota Production System. Implementing one piece flow helps to achieve true Just In Time (JIT) manufacturing. That is, the right parts can be made available when they are needed in the quantity they are needed. The aim of this principle is “to produce and deliver the right parts in the right amount at the right time using minimum resources. The idea of running such a system is to reduce inventory in addition to prevention of early and overproduction.

In the year 2010 Apple faced an issue called Antenna gate. The first batch of iPhone 4S which was launched that year faced an issue of signal error. Since the Supply Chain system in Apple is more demand based rather than inventory based, they were able to rectify the issue very easily. Only the first batch of iPhone were affected by this problem, keeping less inventory helped Apple to resolve this issue in a very fast manner.

4.4 Takt (Takt)

Takt is basically doing production based on demand rather than keeping too many items in inventory. Apple focuses more on Takt method of manufacturing as they produce products based on the demand rather than keeping stocks in inventory. Takt time is the rate at which you need to complete a product to meet customer demand. Takt time is your sell rate and can easily be categorized as the heartbeat of your work process. It allows you to optimize your capacity in the most appropriate way to meet demand without keeping too much inventory in reserve.

The term originates from the German word “takt”, which means a beat or a pulse. Takt time was first used as a metric in the 1930s in Germany for airplane manufacturing. Twenty years later, it contributed significantly to the rise of Toyota from a small Japanese carmaker to the largest automobile company in the world.

$$\text{Takt time} = \text{Total Available Production Time} / \text{Average Customer Demand}$$

Takt time is crucial for optimizing your team’s capacity. It is important for reducing the waste of your process. Takt time can help you maintain a continuous flow of work and reduce Mura (unevenness) in your workflow.

5.Conclusion

Apple has its enviable financial strength, extremely strong margins and very popular brand Apple is favoured with investors. Apple has successfully adopted and implemented the Wholeness System thinking in their organisation. The Supply Chain strategy of Apple is particularly good in terms of Market value. Following are the important points to conclude the identification of Wholeness System Thinking, Supply Chain Management and Lean principles in Supply chain of Apple Inc.

- Apple's Supply chain management makes strategy formulation down to customer satisfaction and focusing on making great products using ground-breaking innovation.
- Apple handles massive product launches without having to maintain large, profit-sapping inventories.
- Apple topped in Gartner Supply Chain top 25 since 2013 and considered to be in Master Category according to Gartner.
- Apple pushed some of its suppliers to relocate their factories closer to Apple's factories which helped them to cut down the logistic cost and delivery time.
- Apple reduced the number of Stock Keeping Units (SKUs) to about 26,000 to simplify and help create more reliable demand forecasts.
- Apple's annual inventory touched a high point during 2017 to value of \$4,8 billion.

6.Reference

1. iPhone delay interrupts that supply chain rhythm [online], Tim Culpan a.s, 2020 [viewed 2021-05-06], Available from: <https://www.bloomberg.com/opinion/articles/2020-10-06/apple-s-iphone-covid-19-delay-ripples-through-tech-supply-chain>
2. Production problems at Apple [online], Trends a.s, 2021 [viewed on 2021-06-10], Available from: <https://www.supplychainmovement.com/production-problems-at-apple/>
3. Apple Warns Of Product Shortage Due To Supply Chain Issue [online], Shannon Bond a.s, 2021 [viewed on 2021-05-19], Available from: <https://www.npr.org/2021/05/01/992670142/apple-warns-of-product-shortage-due-to-supply-chain-issue>
4. Apple warns of iPad and Mac supply issues in second half of 2021 [online], Mike Peterson a.s, 2021 [viewed on 2021-05-25], Available from: <https://appleinsider.com/articles/21/04/28/apple-warns-of-ipad-and-mac-supply-issues-in-second-half-of-2021>
5. Apple Supply Chain - The Best Supply Chain in the World [online], Clara Lu a.s, 2020 [viewed on 2021-06-02], Available from: <https://www.tradegecko.com/blog/supply-chain-management/apple-the-best-supply-chain-in-the-world>
6. Lean Manufacturing / Lean systems for Apple [online], Author Unknown , a.s, 2019 [viewed on 2021-06-08], Available from: <https://www.premiumessays.net/management-research-paper-on-lean-manufacturing-lean-systems-for-apple/>
7. Transforming Supply Chains in Digital Content Delivery: A Case Study in Apple [Journal], Atanu K Nath, Parmita Saba and Esmail Salehi-Sangari, [viewed on 2021-06-08], Available from: https://link.springer.com/content/pdf/10.1007%2F978-0-387-76312-5_32.pdf
8. Understanding Push and Pull Strategies [online], William Joseph Communications, [viewed on 2021-05-24], Available from: <https://www.williamjoseph.com/understanding-push-pull-strategies/>
9. Apple Product Strategy is Changing [online], Above Avalon LLC, a.s, 2019 [viewed on 2021-06-17], Available from: <https://www.aboveavalon.com/notes/2019/6/19/apples-product-strategy-is-changing#:~:text=Apple%20no%20longer%20appears%20to,is%20being%20pushed%20forward%20simultaneously.>
10. 7 Supply Chain Lessons from Steve Jobs [online], Supply Chain Opz, a.s, 2013 [viewed on 2021-06-13], Available from: https://www.supplychain247.com/article/7_supply_chain_lessons_from_steve_jobs