Fundamentals of Supply Chain Management (EC48020)

Assignment 1: Written Report

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| Task | For Lecturer Use |
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# **1. Introduction**

Presenting the flagship smartphone that represents the highest level of excellence in the electronics space, the Apple iPhone 13. The iPhone 13, which is produced by Apple Inc., a well-known technology company with its headquarters located in Cupertino, California, is a remarkable device with state-of-the-art features. This precisely crafted device is proof of Apple's dedication to both innovation and user satisfaction.

With its potent A15 Bionic chip, the iPhone 13 promises lightning-fast performance and seamless multitasking. The Super Retina XDR display produces vivid images, and its powerful camera system takes amazing pictures and videos. The device boasts superior functionality and design, with features like 5G capabilities, an aeronautical-grade aluminum frame, and enhanced durability thanks to the Ceramic Shield front cover.

I've decided on the iPhone 13 because of its unmatched combination of cutting-edge technology, reliability, and elegant looks. Standing as a flagship product in the constantly changing smartphone market, the iPhone 13 represents Apple's commitment to pushing the limits of what's possible in mobile technology.

# **2. Supply Chain Map of Selected Product**

* **Purpose:** A supply chain map visually represents the journey of raw materials from source to the end consumer product, such as the iPhone 13. This map illustrates the intricate network of suppliers and manufacturers contributing to the device's creation. Apple creates this map for multiple purposes.
* **Advantages and Disadvantages:** Firstly, it provides a comprehensive overview of the entire production process, highlighting key stakeholders at each stage, including raw material suppliers, component assemblers, and distributors. By visualizing these relationships, Apple can identify potential bottlenecks or inefficiencies and take steps to address them.

Secondly, a supply chain map helps Apple manage risks effectively. By understanding where and how each component is produced, Apple can anticipate disruptions and develop contingency plans. This might involve diversifying the supplier base, investing in alternative manufacturing technologies, or building additional inventory of critical components.

Thirdly, the map supports Apple’s commitment to ethical sourcing and sustainability. By tracing each component's origin, Apple ensures suppliers adhere to stringent labour and environmental standards, promoting transparency and building consumer trust.

However, creating a supply chain map is not without challenges. Apple's global supply chain involves numerous suppliers, each with their sub-suppliers, making mapping a complex and time-consuming process. Additionally, the dynamic nature of the supply chain requires regular updates for accuracy.

* **Manufacturing process:** Concerning the manufacturing process, the iPhone 13 is assembled using a combination of manual labour and advanced robotics. Automated machines handle precision tasks like installing tiny screws, while human workers manage more complex operations.
* **Company:** The iPhone 13 comprises various components, sourced globally from suppliers like Taiwan Semiconductor Manufacturing Company (TSMC) for the A15 Bionic chip and Corning Incorporated for the Ceramic Shield front cover.
* **Stakeholders Relation:** Stakeholders in the iPhone 13 supply chain range from mining companies providing raw materials to logistics firms delivering the finished product worldwide. Material and information flow between these stakeholders is critical, ensuring the right quantity of products is produced and delivered on time.

In conclusion, the supply chain map for the iPhone 13 represents a complex network of interdependent stakeholders, materials, and information flows. This visualization aids Apple in managing its supply chain effectively, mitigating risks, and upholding ethical and sustainable practices. Despite the challenges involved, the map is a valuable tool for understanding and improving the production process of one of the world’s most popular smartphones.

**Supply Chain Map:**

A diagram of a company

Description automatically generated

# **3. Supply Chain Type and Flow Model of Selected Product**

* **Type:** The supply chain map of the iPhone 13 is a complex, global network that involves a multitude of stakeholders and processes. The type of supply chain employed by Apple for the iPhone 13 can be classified as a global supply chain network. This is evident from the diverse locations of the suppliers, which range from Taiwan to the United States, indicating a global distribution of suppliers and manufacturers.
* **Complex Supply Chain:** This type of supply chain is complex due to the number of different components involved in the production of the iPhone 13 and the global nature of its suppliers. Each component requires specific materials and manufacturing processes, adding layers of complexity to the supply chain. Moreover, the need to coordinate and manage these diverse elements adds to the complexity.
* **Flow Model:** The flow model of the supply chain for the iPhone 13 can be described as efficient. Apple has optimized its supply chain to reduce costs and improve speed and efficiency. This is evident in the use of advanced robotics in the manufacturing process and the strategic placement of suppliers and assembly plants to minimize shipping times.
* **Efficient Model to choose:** Apple likely chose this efficient model because it allows for high-volume, fast-paced production while maintaining high quality standards. By sourcing components from specialized suppliers, Apple can take advantage of the latest technological advancements and economies of scale. This model enables Apple to meet the high demand for its products in a timely and cost-effective manner.
* **Challenges:** However, this model also presents certain challenges. The reliance on a global network of suppliers exposes Apple to potential disruptions due to geopolitical tensions, trade restrictions, or global events like the COVID-19 pandemic. Managing such a complex supply chain requires significant resources and coordination. Moreover, ensuring that all suppliers adhere to Apple's stringent standards for labor practices and environmental impact can also be challenging.
* Despite these challenges, the efficient flow model is suitable for Apple given its large scale of operations and the high demand for its products. The benefits of cost savings, speed, and access to specialized components outweigh the potential risks.
* **Suggestion:** As a suggestion for improvement, Apple could consider investing in supply chain resilience measures to mitigate potential disruptions. This could include diversifying its supplier base, increasing inventory of critical components, or exploring alternative manufacturing technologies. Additionally, Apple could leverage digital technologies to enhance visibility and traceability across its supply chain, enabling more proactive management of risks.

In conclusion, the supply chain of the iPhone 13 is a complex, global network that has been optimized for efficiency. Despite the challenges involved, this model has enabled Apple to deliver innovative products to consumers around the world. As the business environment continues to evolve, Apple's supply chain strategy will undoubtedly continue to adapt and innovate, ensuring the company's continued success in the competitive smartphone market.

**4. Supply Chain Material and Information Flow of Selected Product**

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* **Material Flow:** The materials flow in the supply chain of the iPhone 13 involves several components and stakeholders. The process begins with Tier 1 suppliers, which include TSMC and Murata Manufacturing Company. These companies are responsible for providing essential components such as chips and capacitors. These materials are integral to the functionality of the iPhone 13, serving as the building blocks of the device.
* Once these components are manufactured, they are then passed on to Tier 2 suppliers. This group includes Alps Alpine, Quanta Computer, Cirrus Logic, and Wistron. These companies take the components from Tier 1 suppliers and use them to manufacture more complex parts or integrate them into larger assemblies. For example, Quanta Computer might use the chips from TSMC to build the motherboard of the iPhone 13.
* Following this, the materials reach Tier 3 suppliers, which include Bichamp Cutting Technology, Coherent Corporations, CN Innovations Holding, and Baotou Inst Magnetic New Material. These companies might provide additional materials or services to complete the product. For instance, Bichamp Cutting Technology could be responsible for precision cutting of the iPhone’s metal casing.
* Finally, the assembled product is delivered to Apple Inc., the final stakeholder in the supply chain. Here, the iPhone 13 is fully assembled, packaged, and prepared for distribution to retailers and consumers.
* **Potential Risks:** Potential risks in this supply chain could include delays or disruptions in the delivery of essential components, quality control issues, or changes in the cost of materials. Geopolitical risks are also a factor, as many of these suppliers are based in different countries with varying regulations and trade policies.
* **Information Flow:** In addition to the flow of materials, the supply chain also involves a significant flow of information. This information typically flows from Apple Inc. to the various tiers of suppliers to ensure that all components meet Apple’s requirements. For example, Apple might share detailed specifications with TSMC or Murata Manufacturing Company, who would then use this information to manufacture the appropriate components.
* **Purpose of Sharing Information:** Sharing information in the supply chain is crucial for coordinating activities and ensuring that all parts meet the necessary standards. It can lead to improved efficiency, better quality control, and stronger relationships between Apple and its suppliers. For instance, by sharing its product specifications with TSMC, Apple can ensure that the chips produced meet their exact requirements, leading to a higher quality final product.
* **Risks:** However, there are also potential risks associated with sharing information. These might include the possibility of sensitive information being leaked or misused, or of data being lost or corrupted during transmission. It’s therefore crucial for all parties in the supply chain to have robust data security measures in place.
* In addition to the above, it’s worth noting that many of these suppliers likely have their own supply chains, which would involve additional materials and information flows. For example, TSMC might source raw materials like silicon or rare earth metals from other suppliers and would need to coordinate with these suppliers to ensure a steady supply. This adds another layer of complexity to the supply chain, highlighting the importance of effective supply chain management.

In conclusion, the supply chain of the iPhone 13 is a complex network of materials and information flows, involving multiple stakeholders across different countries. Managing this supply chain effectively requires careful coordination, robust data security, and a keen awareness of potential risks. By understanding these dynamics, companies like Apple can ensure the timely delivery of high-quality products to their customers.

# 5. References

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**Journals:**

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# Appendix – List of Suppliers

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| --- | --- | --- | --- | --- |
| **Tier 1** | | | | |
| **No** | **Company** | **Materials** | **Address** | **Products** |
|  | Taiwan Semiconductor Manufacturing.  Company (TSMC) | Metals, such as aluminum, copper, steel, and tin3.  Plastics, such as polycarbonate, polyethylene, and polypropylene | 13315 Globe Drive, Mount Pleasant, Wisconsin, U.S. | Chips for Apple iPhones, iPad |
|  | Murata Manufacturing Company Limited | **Multilayer ceramic capacitors,** **Chip ferrite beads** | No. 8, Kechuang 2nd Street, Beijing Economic-Technological Development Area, Beijing, China. | Capacitors and other electronic parts |
| **Tier 2** | | | | |
|  | Alps Alpine Company Limited | Magnets, such as ferrite, neodymium, and samarium cobalt | No. 8, Kechuang 2nd Street, Beijing Economic-Technological Development Area, Beijing, China | Switches and Sensors |
|  | Quanta Computer | Glass, such as Gorilla Glass and sapphire glass | No. 8, Kechuang 2nd Street, Beijing Economic-Technological Development Area, Beijing, China | notebook computers |
|  | Cirrus Logic Incorporated | Metals, such as gold, copper, and aluminum, which are used for wiring and bonding the chips | Cirrus Logic International (Taiwan) Ltd., 6F, No. 16, Lane 609, Sec. 5 | audio chips |
|  | Wistron | Magnets, such as neodymium, Plastics, such as ABS, PC, and PBT | China: No. 8, Creation Road 4, Science-Based Industrial Park, Hsinchu, Taiwan. | assembled printed circuit boards |
| **Tier 3** | | | | |
|  | Bichamp Cutting Technology (Hunan) Co., Ltd | steel, copper, tin, and epoxy2 | Room 3401, Floor 34, Building C, Kailin International, No.53, Binjiang Road, Yuelu District, Changsha, Hunan, China. | metal cutting |
|  | Coherent Corporation | silicon, gold, copper, and alumina | 5100 Patrick Henry Dr, Santa Clara, California, U.S.6. | laser systems for Quanta Computer |
|  | CN Innovations Holdings Limited | aluminum, steel, copper, and Gorilla Glass8 | C/O Conyers Trust Company (CAYMAN) Limited Cricket Square, Hutchins Drive, George Town, Grand Cayman, Cayman Islands. | metal and glass components for Cirrus Logic |
|  | Baotou Inst Magnetic New Materials Co., Ltd | neodymium, iron, boron, and epoxy | A1-B1 No.19 Alatan Khan Street, Science and Technology Industrial Park, Rare Earth Hi-Tech Zone, Baotou, Inner Mongolia, China | magnets for Wistron in China |