STRM075 Portfolio (Report)

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Smartphone Industry Analysis

A Consultancy Report For Issues in Apple Inc's Supply Chain

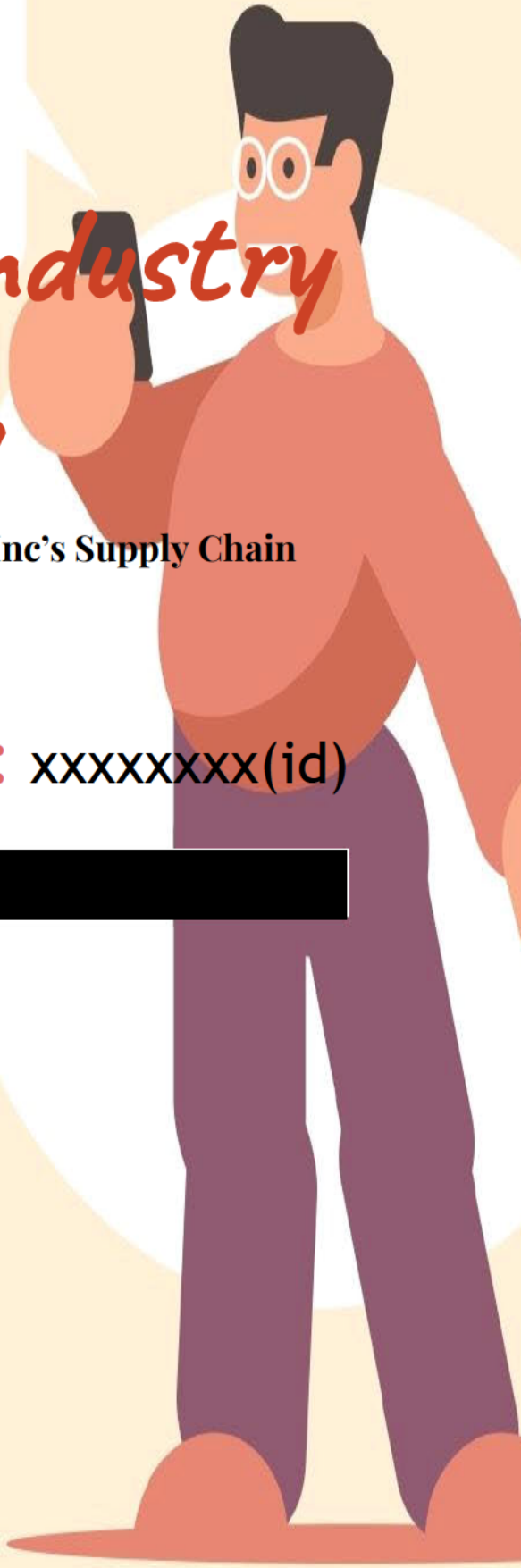

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Table of Contents

Analysing the Industry

With the advent of newer technological means, communication across the masses has become a tedious matter. Smartphone technology has conquered the global consumer market like a fire spreading across the woodland (Adhaban, et al., 2012). Not merely for the purpose of communication, smartphones have found their application in almost every industry including entertainment, business, agriculture, leisure, and so on, so forth. All of this could not have been achieved with the invention of smartphones alone, rather it was the invention of the internet that aggravated the use of smartphones to an extent that today life without smartphones is far from being imagined, let alone considering it to be impossible, (Park and Chen, 2014) . This report analyses how the smartphone industry has evolved over the years.

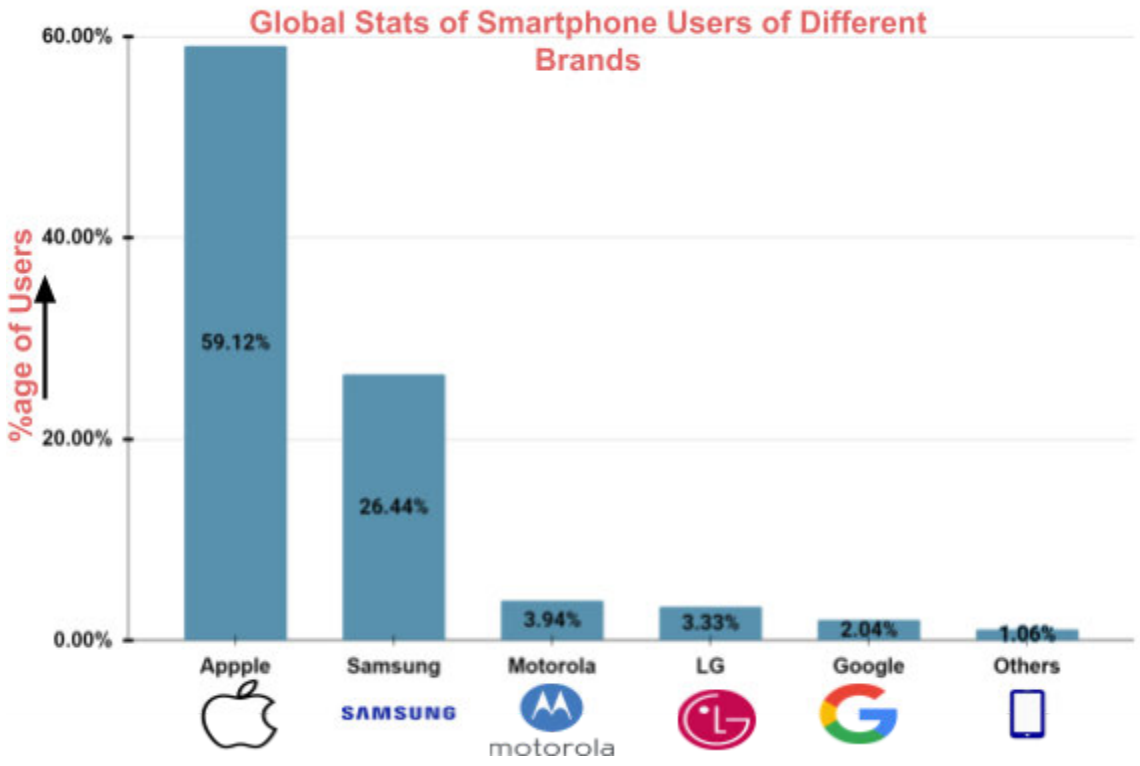
1) Structure of the Global Smartphone Industry

The smartphone industry operates on an oligopoly market structure in which major brands compete with one another in a fashion that their dominance can't be undermined by any newly enlisted smartphone company(Bibliothequer, 2019). That is to say that for the new entrants in the industry, barriers to entry are exceptionally high. This restricts the small participants of the industry from competing for the frontline rank(Reidenberg, et al., 2015). The following section discusses the smartphone industry structure in detail.

a) Smartphone Industry Stats

With the boom of smartphones conquering every other industry in the world, the smartphone industry foresees an anticipated growth of about 7.6% for the 2022-30 forecast duration. (Ocean, 2021)Estimated at 273.9bn USD, the industry is revolutionising human lives and the way activities are carried out.

According to the latest 2022 statistics of the smartphone industry(Turner, no date), of the 5 smartphone giants in America that are licensed by OEM(Original Equipment Manufacturer), significant stat values were analysed by companies: Apple, Samsung, Motorola, LG(Life's Good), and Google. Below is the portion of user percentages (on global terms) that was reported for each brand company.



b) Companies on the Frontline in Industry

Apple and Samsung are normally considered as the most favoured and reputed smartphone companies in the sector (Pandey and Nakra, 2014)with Apple being a leading vendor presently on a global scale statistically(Koetsier, 2021). Both Apple and Samsung along are OEM meaning they design/manufacture their own smartphones.
Other than these, several other smartphone companies like Huawei, Honor, Realme, Vivio, Oppo, and Xiaomi have also won a place in the market because they offer better specs at comparatively low prices. However, Apple and Samsung brands are the most influential that control the entire smartphone market(Kim, Lee and Lee, 2020). So much so forth, the two brands (Apple and Samsung) are often considered transcendent and unmatched by users, thereby labelling other brands as nix in terms of quality, design, battery life, and other specifications.

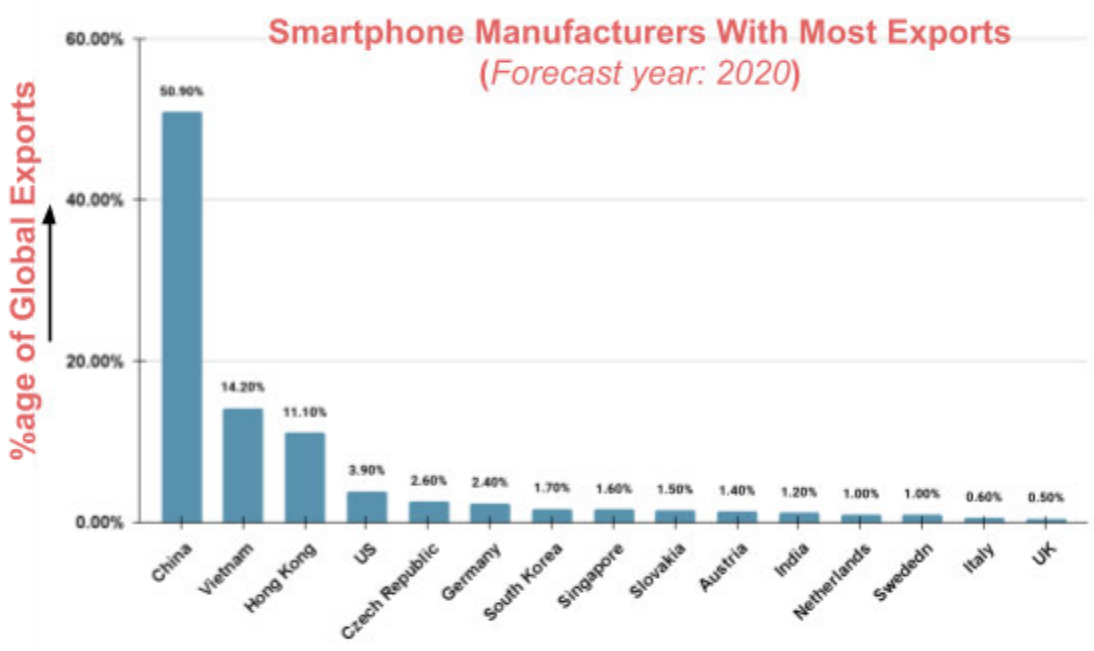
c) OEMs vs ODMs - Leading Manufacturer of Smartphones

The concept of OEM(Original Equipment Manufacturer) and ODM(Original Design Maker) is quite common in the smartphone industry(Chang, 2002). OEM products of a company are the products that the company has self-designed but sources other manufacturing companies(also called ODM) to materialise the company's design into real products.
Among the leading companies, Apple is OEM entirely whereas Samsung is both OEM and ODM.

ODMs are basically manufacturers who mass-produce a design of smartphone they receive from smartphone companies. The manufactured design is then brought by companies with customised branding and sold further under their logo name.
Among the world's top ODM(manufacturers), the following 15 companies top the list:

Country of Manufacturing	Companies
China	• Huawei • Xiaomi Tech • ZTE
Hong Kong	• Lenovo Group
Japan	• Panasonic
Netherlands	• Philips
South Korea	• Samsung Electronics
Taiwan	• Acer
United States	• BLU Products • Apple • Microsoft Mobile • Google Nexus
Vietnam	• FT Group's F-Mobile
United Kingdom	• Bullitt Group
Canada	• Blackberry

In terms of the most exports generated by cell phone manufacturers, below are the 15 ranked on top:



As is evident from the exports stats graph, the Chinese leads the manufacturing market of smartphones industry with the highest export ratio of manufactured smartphones(Prizminstitute, 2022). The immense export rates clearly indicate that smartphones have now become a commodity, enabling nations to turn them into multibillion-dollar business and revenue generation models.

d) Accessing Raw Materials (Components Market)

So far we analysed China to be the main manufacturer and exporter of mobile phones to the world's leading companies which import from China, put on their brand's logo and sell these under their brand name.
The question remains, where does the raw material used in the production of smartphone components and hardware come from?
Truth is, there's no single country that provides all the raw material that goes into the production of smartphone components. This is because the components are made up of multiple mineral commodities that are all sourced from different regions in the world. For the most part, the majority of mineral commodities like Sand, Silicon, Graphite, Indium, Tin, Tungsten, and other rare earth elements used in components manufacturing for the smartphone industry are sourced from China again as the figure(Jeneses, et al., 2016) indicates below.

Mineral commodity	Leading global sources by decreasing tonnage in 2014	Mineral source(s)	Applicable properties of the commodity	Where the commodities are used in a mobile device
Germanium	China[1]	Sphalerite	Conducts electricity	Battery, display, electronics and circuitry, and vibration components.
Graphite	China, India	Graphite	Resists heat, conducts electricity and heat, resists corrosion, and has a high performance-to-weight ratio	Battery anodes.
Indium	China, Republic of Korea	Sphalerite	Transparent and conducts electricity	Liquid crystal displays.
Lithium	Australia, Chile, Argentina, China	Amblygonite, petalite, lepidolite, and spodumene	Chemically reactive and has a high performance-to-weight ratio	Battery cathodes.
Platinum-group metals	South Africa, Russia, Canada	More than 100 different minerals	Conducts electricity	Circuitry, capacitors, and plating.
Potassium	Canada, Russia, Belarus	Langbeinite, sylvite, and sylvinite	Strengthens glass	Screen glass.
Rare-earth elements	China	Bastnäsite, ion adsorption clays, loparite, monazite, and xenotime	Highly magnetic; blue, green, red, and yellow phosphors; and optical-quality glass	LED phosphors, screens, speakers, and vibration motors.
Sand, industrial	China,[2] United States	Silica sand	Gives glass clarity	Screen glass and semiconductors.
Silicon	China	Quartz	Conducts electricity	Semiconductors.
Silver	Mexico, China, Peru	Argentite and tetrahedrite	Conducts electricity	Circuitry.
Tantalum	Rwanda, Brazil, Congo (Kinshasa)	Columbite and tantalite	Stores electrical charge well	Capacitors.
Tin	China, Indonesia, Burma, Peru	Cassiterite	Transparent and conducts electricity	Liquid crystal displays and circuit board solder.

e) Factors Driving Industry Success Rates

- With the leading companies in the industry rolling out newer, technologically advanced, versions of their smartphone models on a regular basis, it is evident that the major driving factor of the smartphone industry is based upon tech advancements(Cecere, et al., 2015) and new geometrical models of smartphones introduced in the marketplace(Tsai and Ho, 2013).

- Trending insights in IoT(Internet of Things) and its applications also has a marked effect on the progress of the smartphone industry(Ogudu, et al., 2019)
- Industry driven standards also affect the smartphone industry(Funk, 2008) as smartphone users handling business operations from smartphones or maybe using smartphones for other memory and processor-heavy work, often require keeping their confidential data protected and privacy ensured. Additionally, no one accepts a lagging phone today. Even kids these days have high demands in regards to phone memories and processors for playing the favourite variant of their 3D games. This caters to the need for heavy processing and requires a bigger memory size. So the companies operating in the smartphone industry set out industry-driven standards for their different models that allow users to purchase a version of their product model that meets the necessary requirements to run an application.
- Wearable technology like smartwatches etc is the new normal(Ometov, et al., 2021) in an industry that has been accepted globally and continues to aid smartphone industry development.
- 5G technology has been geared in by some brands in their latest models which offers fast speeds, reduced latency rates, and instant data capture from the internet. While some brands are still working on the technology, others have already launched their first initials geared with this latest tech. And by the traction these models received, it's evident that the technology will push the industry stats even higher(Hassan, Yau, and Wu, 2019).
- Another major factor driving a smartphone's industrial success is the camera pixels. People are always on the lookout for more Megapixel values and a greater number of camera lenses with more in-depth shot taking ability on smartphones which they believe enhance picture quality(Hilderbrand, et al., 2012).
- Foldable smartphones have also found their place in the list of trending items for the smartphone industry. Although initially due to mechanical failure, the technology failed to impress masses. However, with Samsung introducing flexible screens the technology has finally been accepted by the majority(Jones, no date). These too will contribute positively to the driving factor of the industry.
- Augmented reality and Virtual reality headsets that completely modify the surrounding environment virtually have also aggravated the demand for AR and VR compatible smartphones(Hillmann, 2019). This too has contributed positively to the smartphone industry.

2) Analysing the Supply Chain of the Smartphone Industry

a) Market Distribution

The market distribution of smartphones is mostly dependent on the specification of the handset. This makes up for 8 distinct smartphone market distribution channels with each segmented into further sub-segments. Here's what smartphone market distribution looks like:

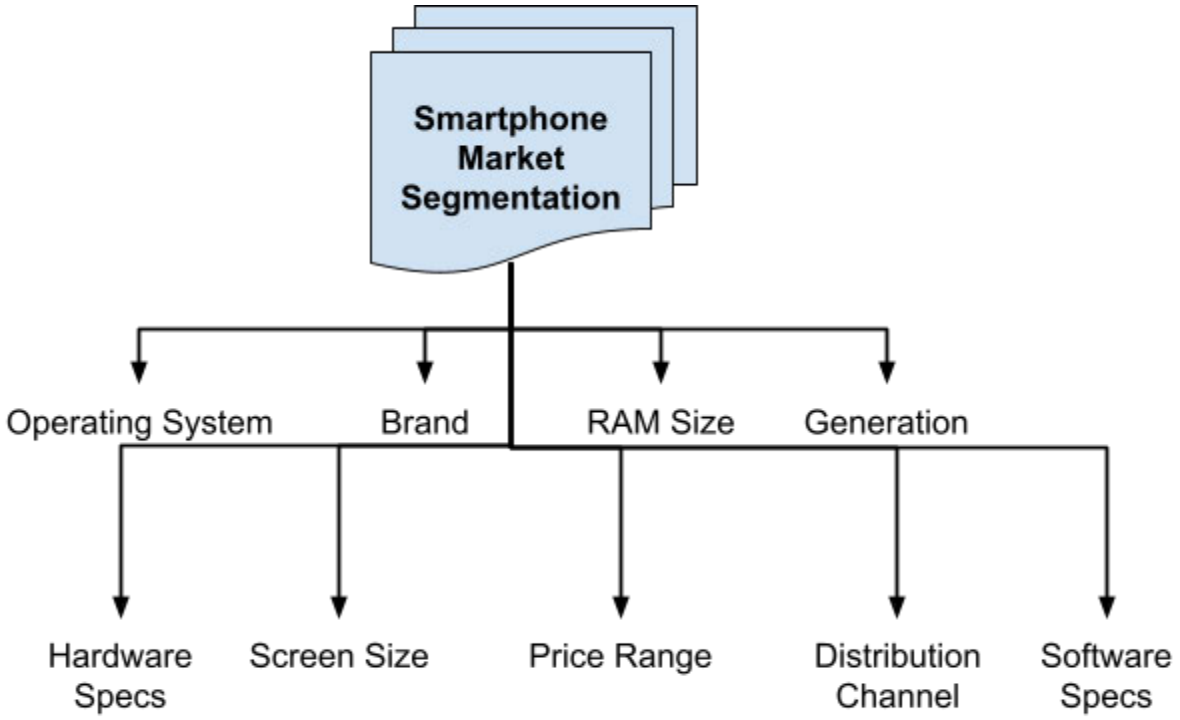


Figure: Market Distribution of Smartphone Industry

b) Supply Chain of Smartphones and the Issues Faced in it

Although made up of only three main stage areas, the smartphone supply is rather more complex than it often appears.

- In the first stage, extraction of raw materials like silicon, sand, etc is carried out which forms the critical first nodal ingredient of the smartphone market. The extraction is usually carried out from mines and caves which are not safe sites for working without necessary measures taken. And most of the time, worker rights are not satisfied which causes both material and living losses(Van and Haan, 2008). Additionally, the waste material generated after the extraction of rare earth elements has also caused some severe environmental pollution which has resulted in severe public health concerns.
- In China, corruption at the governmental level in the mining of rare earth elements has led to rife conditions that had given rise to child enslavement and enforced labour along with bribery(Cole, Elliot, and Zhang, 2008).
- The second stage includes the moulding of raw materials into desired component elements. The final product of this stage varies depending upon the type of component manufactured from amongst a list of millions yet trillions of components used in smartphone industries. This can be understood from the fact that the iPhone or Apple's one smartphone is an amalgamated piece formed by joining various components sourced by over 200 different suppliers(Jenness, et al., 2016). This is the complicated

part of the process of which even the brand companies aren't very well aware. During the entire phase, multiple labour violations have been reported(Webb, 2018). A number of other issues like the hiring process laced with discrimination, low wages, prolonged working hours, and lack of training are also present.

- Finally in the third and the last phase of the supply chain; the Assembly, issues related to labour rights abuse cause certain employees to commit suicide (Ngai and Chan, 2012) due to the intense working environment.

3) Apple: Assessing the Issues faced in Supply Chain

Apple, one of the leading giants of the smartphone marketplace has topped the list of most smartphone supplying brands in the past year. Over the past month, this giant smartphone manufacturer has observed a 3x growth over the past year (Leswing, 2022).
Even when the company has grown globally, there are still some issues present in its supply chain which affect its sustainability and effectiveness.

a) Ethical Issues

- Labour risk oversight leading to major issues like lawsuit filing(for the death cases and serious child injuries) of several families against the company has affected the overall reputation of the firm to a great extent. This states that child labour(Clarke and Boersma, 2017) is yet another issue present in the company's supply chain.
- The company also has received the worst mark, as of 2019, by the Ethical Consumer Evaluations committee because the company was involved in carrying out acts that avoided tax collection(Taylor, 2019).
- The company is also criticised for the in-place discriminatory hiring procedures, lack of safety training, long work hours, and low wages(Lockamy, 2017).

b) Sustainability Issues

- One of the major issues caused in the supply chain of the leading smartphone manufacturer is the climate change affecting freight delivery and hardcore extraction of rare earth elements(Lockamy, 2017).
- Lacking governance models(Dudovskiy, 2021), lack of proper policy disclosures. Apple scored a poor score of 42% in regards to its corporate governance models in terms of these factors as of 2019.

c) Social Responsibility Issues

- The company's production units have been under the radar since 2019 when the Environmental and Social Responsibility Report of the company indicated the use of potentially harmful chemicals that affected the surrounding environments severely. Some of these harmful chemicals include PVC, Phthalates,etc(Patrick and Duane, 2010).
- NYT disclosed to the public that products from Apple went through 94 identical production lines with over 400 crucial assembly junctions. This simply disclosed the

number of machinery operations involved and the waste coming out of these production units, of course, isn't useful to the environment.

- Yet another potentially strong issue facing the supply chain is the accusation of planned obsolescence on the company by Italian authorities who believed the company products soon became obsolete and no longer supported by the latest versions of their operating systems giving the image of the company being a major toxic electronic waste generator.

4) Apple: Company's Future and Recommendations

a) Recommendations for Company's Supply Chain Strengthening

- Implementation of IoT(Mohammed, Hassini, and Bahroun, 2017) and big data concepts in its supply chain can significantly help the firm gain better insights into business performance and its effective execution.
- With the fastest and most efficient inventory turnover rate of ten days, the company can further strengthen its supply chain to employ outsourced warehousing, thereby bettering trade-off in-house dependabilities.
- Through strong relations with suppliers and company's sourced ODM's, sustainability in the supply chain can be furthered.
- Policymakers of the firm should encourage, via company policies and patented protection(Patrick and Duane, 2010), investing in innovation and high ROI opportunities.

b) The Envisioned Future of the Company

According to Tim Cook, the Chief executive officer of Apple Inc, The future of the firm has already been envisioned and concurrently chiselled on the company's products. Here's how the vision, more specifically a roadmap, for the company's future 10-yrs unrolls.

- The all-new Augmented Reality platforms and the VR tools, for now, seem too good to be true, however, for Apple, these are considered to be a crucial future working point that'll revolutionise the smartphone and the tech industry on the whole.
- What makes Apple's vision of AR and VR different from other giants is that they are using integrable additional devices like VR headsets etc to avail the tech, however, Apple plans to integrate the entire concept of AR and VR into their iOS 16 which is expected to hit the market this fall.
- Apple also envisions investing in its Trojan horse projects(Rayna and Striukova, 2009) that include HomePod and Ambient computing technologies that'd allow the users to command Sirri for desired output.

5) Conclusion

The smartphone industry has achieved tremendous success over the years. Despite all the supply chain issues faced, the companies in the industry have been able to build sustainable business models that exercise a competitive edge over their competitors. Going forward, it will

be interesting to see how the industry continues to adapt and evolve with the changes in technology.

Apple as a leading tech and smartphone giant in the industry has earned global recognition among iOS users. The company has released a long line of innovative products that have changed the world and revolutionised the way activities are carried out on a global level. It's not surprising to see why Apple has been such a successful tech giant despite the issues faced in its supply chain management.

The company has also consistently delivered innovative products that wow its fans and earned them rave reviews from the media. There exists a strong potential for the firm to strengthen its supply chain management by overcoming issues faced. Adopting the recommendations disclosed herein, for instance, can help sustain the supply of its products ethically while acting in a socially responsible manner.

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