**IS 501 – ASSIGNMENT 2**

1. There are five competitive forces that are bargaining power of buyers, rivalry among competitors, threat of new entrants, threat of substitutes and bargaining power of suppliers. The following sections includes how five forces are affected by smart and connected products.

Bargaining power of buyers:

Smart and connected products provide the companies to generate new opportunities for product differentiation more easily than before. The new approach changes priorities of the companies since they often thought price of products rather than its other aspects of products. However, the companies can now consider product differentiation so as to take competitive advantage. Also, smart and connected products enable the companies to get much closer relationship with customer and the companies which knows what exactly the customers desire for thanks to market segmentation, product customization and more value-added activities supported by smart, connected products. Product usage data availability has increased, and it leads to increase switching cost of customer and it decreases bargaining power of buyers. Moreover, intermediary entities that are between the suppliers and the customers regarding supply chain has disappear due to smart, connected products. That means profitability of the suppliers will increase. GE Aviation is good example of disintermediation to the customer according to the article. In addition to decrease in bargaining power of buyers, smart and connected products can also increase the power of buyers. The buyers can detect true performance of products due to transparency regarding information availability between suppliers and buyers. The buyers can evaluate recommendation of the suppliers more precisely due to product usage data. Also, switching cost of buyers may decrease thanks to new business models such as “product as a service”.

Rivalry among competitors:

Smart, connected products allow the customers to get specialized and individualized products for their companies. In addition to customized products, huge amount of data and service recommendations can be provided to customers thanks to smart, connected products. For instance, Babolat Play Pure Drive system allow the users to develop their tennis performance. Cost structure has been changed such that most companies now has high fixed cost and low variable cost due to software development, customization of products. Also, sectors that were not in competition before may compete with each other. For instance, manufacturers of home lighting and climate control systems can compete in order to involve with “connected home” as product system.

Threat of new entrants:

The fixed cost is high in the stage of software development, constructing technology stack and product design. Due to this reason, new entrants should deal with challenges about high cost to enter new industry. Thermo Fisher’s TruDefender FTi is example of facing high cost barrier. Product functionalities and many opportunities have increased dramatically, and it causes extension of product definitions. That leads to higher barrier for new entrants. Much closer relationship with supplier and buyer increases buyer loyalty and switching cost. This results in making harder to get into new businesses. On the other hand, new entrants can obtain new opportunities to get into new businesses. For example, OnFarm helps the farmers to develop newly service refers to “productless” that supports better decisions for agriculture.

Threat of substitutes:

Superior and customized products make substitution threats decreased and they have created new substitution threat in a way that they can cover all functionalities of traditional products like watches. Fitbit’s wearable fitness device is example of smart, connected product. New business models like Product-as-a-service leads to generate substitution threats regarding product ownership. For example, Martı in Turkey can be considered as product as a service since they have scooters and serve to the user without the ownership.

Bargaining power of suppliers:

Usage of software will increase exponentially results in diminishing needs of development of physical products that leads to decrease bargaining power of traditional suppliers. However, bargaining power of suppliers such as Apple and Google that produce technological stack components like sensor, connectivity element increases. Also, new suppliers of the technological stack for smart, connected products provide the customer to offer better services such that the capabilities of services will enhance when the suppliers use product usage data provided by the users.

1. Four generic strategies for coping with competitive forces are low-cost leadership, product differentiation, focusing on market niche and strengthen customer and supplier intimacy.

Low-cost leadership:

Smart, connected products has been shifting competition from price alone. That means low-cost leadership strategy may not be enough for the companies in order to compete effectively since most companies adopted development of smart, connected products offers many opportunities like customization of products and product system to the customer. Therefore, the companies should not only manufacture standardized product as low-cost leadership regarding taking of competitive advantage.

Product Differentiation:

Product differentiation has become fundamental strategy of the companies supported by using Information Technology. Due to advancement in smart, connected products industry, the companies can make different types of products and product systems more easily. Most companies can take competitive advantages thanks to product differentiation such that product differentiation provides customized products and brand loyalty that enables the supplier to gain bargaining power. Also, thanks to product differentiation, treat of substitutes will decrease.

Focusing on market niche:

In order to take competitive advantage, the companies must make difference to get attention of the customers. One way of getting attention is focusing on market niche. Niche market is about targeting one portion of whole market. Smart and connected products provide product usage data. The data can be used for analytics, customer segmentation etc. Customer behavior in niche market now is more predictable thanks to huge amount of data and data analytics provided by smart, connected products including sensor, connectivity entities etc.

Strengthen customer and supplier intimacy:

Smart and connected products enable supplier and customer to get closer relationship such that they allow no need for distribution and service entities between supplier and customer. Distance between customer and supplier will decrease and their profitability will increase regarding supply chain value. Furthermore, the customer can get more information about products by using product usage data and monitoring its performance. GE Aviation can be example of customer and supplier intimacy.

1. Value chain activities transforming with the new era of smart and connected products are mainly design, after sale-service, marketing, human resources and security. The first one is design. Software based customization and standardized physical products are essential for smart and connected products regarding design. Development pace is different from software and hardware in a way that software development speed is higher than hardware development speed. The second value chain activity is after sale-service. Smart product provides preventive maintenance. Product usage data can recognize potential errors and breakdowns and debug them. It leads to decrease maintenance cost. The third one is marketing. Thanks to analytic works, effective market segmentation can be achieved. The more suitable offerings about marketing goals can be made by the help of product usage data.

Low marginal cost can be obtained via software development compare to hardware. Human resources professionals can select qualified personnel by using techniques inheriting from smart analytic products. The last concept is security. Smart and connected products require effective security management since they all connect with other and they have potential risks about stealing information generated by these devices. Information in technological stack must be protected by the help of newly authentication methods.

1. There are five moral dimensions of the Information Age that are information rights, property rights, accountability and control, system quality and quality of life. The following sections related to the moral dimensions will show ethical issues have been transfromed by smart and connected products.

Information Rights:

Smart and connected products can reach customer information in order to serve better experience to the customers. For example, Google Maps can detect where the users go frequently, and it can shows the user’s home and workplace. The users who do not desire for using their information may restrict application access regarding privacy. This is an example of individual effort but there are global works about privacy. For instance, EU member nations prevents citizens' data from reaching to other countries without privacy protection since huge amount of data can be generated and used for different purposes via smart and connected products without any citizen’s permission.

Property Rights:

Large projects like smart city can be achieved by the combinations of different solutions and companies. Therefore, the companies can share innovations of their smart and connected products with other companies properly to finish the project. The companies should take into account intellectual property regarding sharing innovations and they may select alternatives like trade secret and patent to protect their products. For example, EU companies have desired for participating in smart city project in Vietnam and they share their innovations with third party companies.

Accountability and Control:

Accountability has comprises determination of responsible entities. It is vital for user satisfaction such that according to European Union general data protection regulation, accountability is compulsory aspect must be followed. It aims to prevent data violations due to smart and connected products.

System Quality:

Superior, smart and connected products now have lower number of bugs and hardware failures than before since most of them have predictive maintenance and early detection system that enhances system quality.

Quality of Life:

Smart and connected products transform our life positively and negatively. There are lots of different ways of explaining these entities but a few of them are presented. The products include positive aspects like easy to access information. For example, wearable fitness watches allow the user to keep track of calories burned and pulse rate instantly to improve their health performance. On the other hand, there are negative effects of the products. For instance, global position of people can be detected, and boundaries of private life is violated due to smart and connected products.

1. I am working on a company in Defense Industry. My company produces critical and highly technological products and main customer of my company is Turkish Armed Forces.

Software development has become more important than hardware development thanks to smart and connected products. Therefore, product differentiation gets more easily and newly solutions that respond better to customer requests have emerged. My company has given more importance to product differentiation as business strategy through new technologies like artificial intelligence and newly connectivity solutions. While my company used to produce standardized and large number of products, now it produces products with different software and capabilities with similar hardware that meet customer needs effectively and efficiently. For example, thanks to new types of smart and connected products, devices can be remotely connected, and problems can be detected and solved with less effort.

In New wave (aka third wave), the product itself has changed a lot with the third wave compared to previous waves. The products have new functions and high performance with increased usage data. Third wave has been particularly effective in manufacturing industry where my company is by changing Porter’s five competitive forces. My company has developed different types of software thanks to new technologies and the performance of the product has increased thanks to data analytics. My company is aware of the importance of data analytics and aims to grow in this area with recruitment since data analytics is an important factor in both product performance and process improvement.

Since the Turkish Armed Forces, the main customer of my company, are not yet mature enough to benefit from smart and connected products, we cannot talk about their increase in bargaining power as buyer. On the other hand, my company, which adopts new technologies and applies them in its products, offers better services to the users by using product usage data. With the development of smart devices, our company has started to use its knowledge and experience in military technologies in the health industry. For example, my company now manufacturers MR and tomography devices for state hospitals in Turkey by using knowledge which is easier to emerge with smart products. My company has entered an industry that it has never been before and started competing with other companies in the industry that refers to threat of new entrants. My company reduces threat of substitutes as it includes product differentiation in its products with different and large capabilities.