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Sustaining Innovative Success: A Case Study on Consumer-Centric Innovation in the ICT Industry

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Abstract: The phenomenon of innovation growing rapidly and having a shorter lifespan is a structural change due to the development of ICT (Information and Communications Technology), diverse investment methods, and reduced pattern of innovation adoption. For ICT companies to survive and maintain their success in this ever-changing environment, they need to succeed in fulfilling both productivity and accuracy of innovation. To sustain their innovative success, ICT companies should consistently maintain the direction of innovation towards consumers. The present study analyzes various cases of ICT companies which succeeded or failed to maintain their prior innovative success, and suggests consumer-centric innovation as a solution. To create consumer-centric innovations, companies have to (1) predict the dynamically evolving demand of consumers and continuously transform; (2) proactively employ observation method and big data analysis to discover hidden demands; and (3) identify hassles such as wastes, inconveniences, and anxieties, and put effort in solving these hassles.

Keywords: sustainable innovation; consumer-centric innovation; sustainability; consumer hassle; behavior observation; big data analysis; ICT industry

1. Introduction

The competition between existing companies and new companies is getting intense as the speed of technological development is very high and diverse technologies are integrated in the ICT industry. Accordingly, ICT companies need to improve the performance of products and services and continuously pioneer new markets in order to survive [1–4]. Numerous past studies showed that innovation increases sales and further significantly impacts firm survival [5–7]. Innovation has become a crucial goal for ICT companies.

Companies that have already succeeded in innovation like Apple, Google, Amazon, are accelerating for another leap, and followers such as Samsung Electronics, LG Electronics are chasing right behind to go beyond. Furthermore, venture companies are also producing innovation to change the competition to their side with their original ideas and entrepreneurial spirit. One can be sure to say that the modern society is in the renaissance of the innovation era [8].

Can all innovation companies survive and maintain their success in this competition? Unfortunately, innovation is not in a necessary and sufficient relationship with the company's success. This means that even though a company can dominate the market with its innovation, it is only extending its period of survival, and the lifespan of innovation is gradually decreasing. Even though a company can finally achieve the first place through much endeavor, maintaining this success is much more difficult [9,10]. In 2008, everyone was enthusiastic about Nintendo's home video game

console, Wii. Sony's high-performance and high-definition Playstation was competing with Microsoft's Xbox when they suffered a sudden counterattack from Nintendo as Nintendo targeted the general population (i.e., soft users) rather than gamers (i.e., hard users) which were the main targets of Sony and MS. The market seemed to quickly reorganize with Nintendo being in the center [11,12]. However, before long, Apple and Google App Store captivated Nintendo's customers through the technology development of smartphones. This happened in just 4 years after Nintendo took the lead. Dell Computer, which introduced a new paradigm in the computer market by mass customization with extreme production efficiency, became the leader in 2001, but lost competition in 2006 due to HP and Apple's customer-friendly designs. In 2007, Wall Street articles started to mention Dell's crisis, and Dell's glory days ended in just 5 years. Through Nintendo and Dell's cases, we can see that one's innovative success does not guarantee survival, and the compensation period is shorter than expected. Even if innovative success is achieved, newer innovations should be prepared immediately to keep the success.

What and how can companies prepare to survive in this innovation renaissance era? The answer is already out, though it is simple. Seek for means to increase productivity and accuracy in innovation, and put effort in being ahead in the continuous competition of innovation. As companies have limited resources, establishing the direction of innovation and obtaining efficiency to achieve both productivity and accuracy are most important [13–15]. Specifically, two main purposes are provided as follows. First, this article asserts that the direction of innovation should be focused on consumers by identifying structural changes in the environment of innovations. Second, it provides guidelines to achieve consumer-centric innovation by analyzing multiple case studies.

The structure of this paper is as follows. Section 2 describes the phenomenon of the decreasing lifespan of innovation caused by structural changes in the environment of innovations. Section 3 presents the cases of Amazon and Sony's E-book to highlight the importance of setting the direction of innovation towards consumers. Section 4 analyzes multiple case studies and suggests guidelines to achieve consumer-centric innovation. Last, Section 5 provides a summary of the conclusions and discusses implications, limitations, and directions for future research.

2. The Decreasing Lifespan of Innovation

In the past, innovative companies had at least one generation for enjoying their achievement. Ford who discovered cars, Sony with Walkman, and Motorola with cell phones, all had a success that lasted for one generation. Let's glance at Nintendo's case that was mentioned earlier. On 5 January 2012, Nintendo's CEO Iwata Satoru announced to his workers, "We will fail if it keeps going like this". This was pretty shocking at that time. In 2004, they announced their start of innovation by introducing the DS, a portable game console, which was followed by their motion recognition featured home video console, Wii, in 2006. Through these successes, Nintendo became the world leader in the game market. However, Nintendo's stock price downturned after their record breaking highest price in November of 2007. The target users of Nintendo had swiftly moved to the smartphone game market. Nintendo's success was a mere four years. This can be compared with Sony's Playstation which was first introduced in 1994 and continued its success for over a decade.

As the speed of innovation is increasing, the lifespan of innovation is decreasing. In other words, the cycle of innovation has shortened [8,16,17]. This phenomenon is not because of an "accident" by a genius company, but by structural change that was caused by the faster speed of creating and spreading innovation by changes in the management environment itself.

Let's look into the four primary factors. First, one can decrease initial capital and development risks for commercializing innovative ideas and technology due to the development of ICT and infrastructure. In specific, using technologies like open platform and open source can largely decrease initial development time, and open markets like Apple and Google's app store help in saving time and costs when creating and ensuring distribution channels [8]. Furthermore, cloud service allows users to eliminate the process of extending servers and computing resources, which also omits the need for

space to store servers when expanding business. Instagram started its service in October 2010, and in less than 2 years in September 2012, they had one hundred million users. Instagram could handle a tremendously increasing number of users with just a dozen or so members by using open platform and cloud service.

Second, as the number of investors and investment methods for startup companies increased, it has become easier to procure capital. Due to the increase of different types of investing institutes and highly advanced investment supporting systems like funds from the government and investing institutes, venture capital, crowdfunding platforms, and etc., it has become easier for startup companies to obtain the necessary capital [18–20]. Alibaba, which recently succeed in IPO, was invested by Japan's Softbank, and Google Ventures which started in 2009, is currently investing in over 250 innovative ideas like Uber, a car sharing company and a genome analysis service named 23andMe. In addition, crowdfunding allows small investors to invest in innovative ideas as well [21]. A crowdfunding platform named Kickstarter, which started in 2009, has invested in low-cost 3D printers, and e-paper based wristwatches that are linked with smartphones.

Thirdly, the changed pattern of consumer's innovation adoption is also a major factor that influences the speed of innovation. According to Rogers [22,23], who asserted diffusion of innovation, there are generally five categories of adopter based on innovativeness from Innovators to Laggards. However, consumers are recently showing a shorter pattern of adoption towards innovative technology. Downs and Nunes [16] indicate that the categories of adopter have decreased to two (Figure 1). The trial users test the product performance first, and the vast majority accepts the product quickly afterwards. This indicates that consumers are familiar with handling information technology, and as the Innovators share their information on SNS like Facebook and Twitter, it rapidly spreads to the majority of consumers as they learn about these products easily.

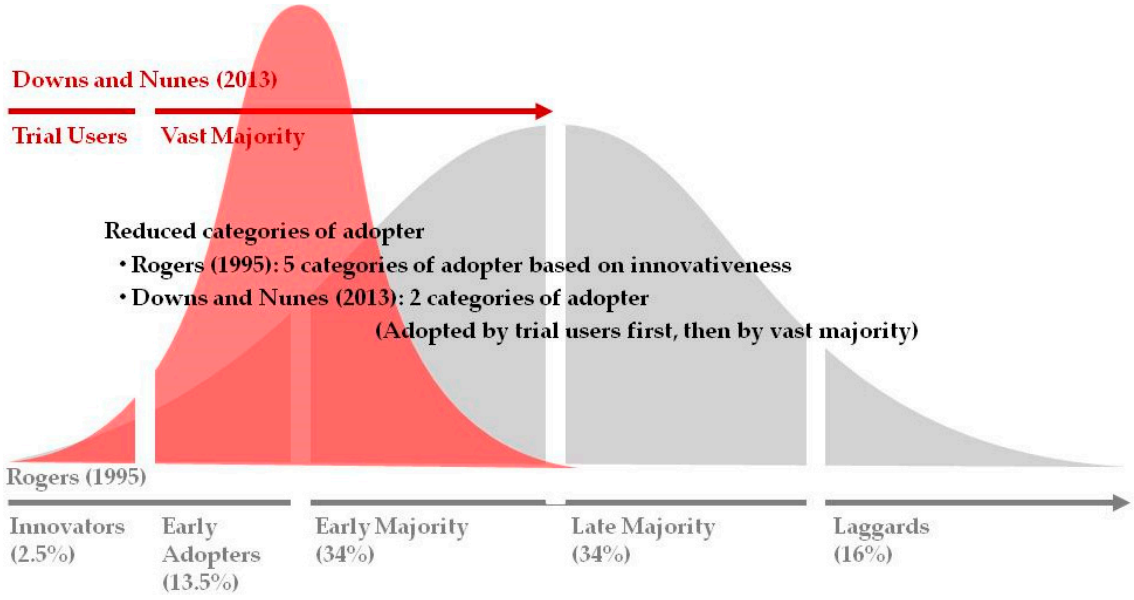

Figure 1. The change in the innovation adoption pattern [16,22].

Last, open innovation decreases investment costs for innovation and improves the speed of innovation. Open innovation, as a solution to procure lacking skills and management resources, helps to reduce R&D costs and time for development [24,25]. In the ICT industry where the speed of technological development is fast, open innovation is important for the creation of innovation because a firm cannot possess all skills required for innovative activities [26]. Recently, Uber utilized an open innovation strategy to enter the driverless car market by establishing a strategic alliance relationship with Fiat.

3. Maintaining the Direction of Innovation towards Consumers

Which direction should innovation face? This is an easy and difficult question. In order to achieve both consistent production and high accuracy of innovation in an environment with limited labor and material resources, establishing the direction of innovation and efficiently centering resources seem to be the only solutions. Everyone knows that the users of innovation are consumers. However, there aren't many innovations that actually move the consumers [17]. Christensen emphasizes the presence of disruptive innovation can be perceived by observing previous consumers and non-consumers, and seizing the opportunity for a new disruptive innovation is possible [27]. Day and Moorman advise that innovation should change from previous management strategies, which was the Inside-Out strategy that focuses on the inside of companies such as resources and core competency, to the Outside-In strategy that underlines all company's activities like production development, which should be focused on consumers [17]. The coherent opinion here is that innovation comes from the consumers. Unlike the traditional, manufacturer-centric model, the user-centered innovation process provides great advantages since it allows development of what users really want and need [28–30]. User-centric innovation became a very common and powerful phenomenon.

Even if innovation runs towards consumers, they may not be chosen in the market. Let's look at Amazon and Sony's E-book competition to see the importance of consumer-oriented innovation [31]. Amazon's E-book, Kindle was first released in November 2007, and after just one year in 2008, Kindle had an estimate of selling approximately half a million, which led to $200 million in sales. The growth speed is astonishing considering that the E-book industry was just beginning. Fourteen months after the first model, Amazon released Kindle 2 which had a TTS (Text To Speech) function that could read contents. Kindle 2 sold rapidly as well, and Amazon dominated the E-book market. However, how many people can remember that Sony, who invented E-book Librie, gave the idea of Kindle to Amazon? In 2004, much before Kindle was released, Sony's Yoshitaki Ukita purchased the use of E-ink technology and created Librie, with Sony's world leading electronic technology. Librie was a highly innovative product. It was even evaluated to be more advanced than Kindle which was released three years later. For example, Sony's Librie had eight levels to control display brightness, but Kindle had only four. Further, many reviewers favored Librie's design.

Then why didn't people choose Librie, but make it long disappear in their memories? Sony and Amazon both released similar innovative E-books, but why did only Kindle succeed? In the consumer's perspective, Sony's Librie was a beautiful, but not very useful product. The first Librie supported only Japanese, and could store up to just 1000 books. Moreover, it had to be physically connected to the computer for downloading, and the content could only be owned for six days. On the contrary, when Kindle was first released it had already secured 88,000 books including recent bestsellers, and E-books could be downloaded anywhere and anytime through wireless internet. In addition, most of the E-books were approximately $10, which is much cheaper than hard covers and paperbacks.

At a glance, Amazon and Sony adopted the same E-ink technology, in the same innovation category, E-book readers. However, the directions of their innovation were different as one was focusing on consumers and the other on the product itself. Amazon's CEO, Jeff Bezos understood that the most important factor for consumers when purchasing E-book readers was abundant reading contents, and accordingly cooperated with publishing companies with his leadership. He concentrated to secure plenty of contents with lower prices. He also acknowledged that users purchasing lightweight E-book readers would also stress on the mobility, and provided convenient downloading by wireless internet. On the other hand, Sony devised their innovation direction in improving their hardware superiority. After Librie's failure, the new "Sony Reader" was released in the U.S. market in 2007. Certainly, the innovation was strengthened after their failure. Nonetheless, they assumed that the reason for their failure was insufficient hardware capacity, and they failed once again to identify consumer demand from contents perspective. Compared to the Librie, the new reader had a much better contrast and legibility with a large 6 inch screen and a better grip design. However, there still wasn't a wireless internet application and users had to purchase contents through Sony's own online

store, Connect, which was far behind in competition with iTunes. Moreover, the goal of their contents was estimated to be about only 20,000 books.

4. Sustaining Innovative Success: Guidelines for Consumer-Centric Innovation

Innovative leaders can be enveloped by the "competency trap" and "innovator's dilemma", which prevent them from seeing consumers, and the success equations that they had already figured out through previous experiences like path dependency and cannibalization can hinder them from new decision making [27,32]. To this extent, companies should consistently maintain the direction of innovation towards consumers to sustain their success.

As marketing efforts, competition, and changes in the business environment trigger the evolution of consumer demand for innovations [33], consumer preferences for innovative products evolve over time [34]. Consumers want and need better performance than before in terms of efficacy of produce use, effectiveness, and ease of use. Thus, understanding consumers' evolving demand is important for new product development. Previous studies highlighted that identifying consumers' hidden needs is critical to create innovative products. Goffin et al. studied multiple cases using ethnographic research methods in new product development, and stressed the importance of discovering and understanding consumers' hidden needs in new product development [35,36]. Much of consumer behavior is goal-directed, and goals play an essential role in the purposive behavior of consumers [37]. Because consumers have a strong desire to pursue a goal [37], they intend to consume more on what is helpful for achieving their goals. Goals play an important role in new product adoption because it is hard for consumers to judge whether a new product satisfies their needs without prior knowledge or experience about the new product [37,38]. Thus, companies should consider which goal can be attained by using innovative products. This article proposes guidelines that support the three characteristics of consumer demand, which are "Evolving", "Hidden", and "Goal-oriented", for achieving consumer-centric innovation.

The present research adopted a case study methodology. First, companies were identified by referring to lists of world's innovative companies published by BCG, Forbes, Thomson Reuters, and MIT, from 2014 to 2015. Then, further information was retrieved by examining these companies' annual reports as well as reports published by economic and management research institutes. The cases studied were selected in consultation with experts from the ICT industry.

4.1. "Evolving" Demand: Taking Daring Transformations and Breaking Away from Compromising

Consumer demand evolves rapidly while interacting with innovation. Consumers who are familiar with wired and wireless network want faster speed, and consumers who used the Internet on desktop computers want Internet on their mobile phones. It may not be easy, but companies must continuously pursue innovation while preventing themselves from compromising to correspond to the evolving demand of consumers [39,40]. Companies should even take drastic measures in forgoing their outcomes depending on the consumers. They should promote a whole range of transformations from their business model to restructuring their main field if necessary. The important point here is that companies have to take action in changing constantly [41].

There was a company that predicted the change of consumer demand and took action in radical transformation that even cut their own profits. Let's look at Netflix's case. When the Internet was still new in 1997, Netflix started a business with an idea of lending DVDs online. At that time, Blockbuster was the leader in the DVD rental market with their offline shops, and the main profit sources of this traditional business model were rental and late fees, and customers were also charged extra proportional to their rental period. Netflix's founder, Reed Hastings, found that consumers did not like these charges. Specifically, he found out that late charges could even add up to purchasing a new video. Recurrent late fees discouraged consumers to use services again, and Netflix appeared just in time. Netflix showed rapid growth with their innovation business model of fixed monthly payments and no late fees that allowed consumers to return borrowed contents when they desired.

Reservations were made online, and after receiving DVDs by post mail, users could just return the DVDs by sending them back from their closest postbox. How convenient was this? Due to Netflix's fast market encroachment, Blockbuster attempted to fight back by expanding contents in their offline stores, but the results turned out to be useless.

The surprising fact we want to focus here is Netflix's move afterwards. After 3 years of their victory in 2007, Netflix started to provide a VOD service based on streaming called Watch Instantly for its users. The VOD streaming service was a new business model that disrupted Netflix's previous target, the DVD rental market. Netflix took a smart step and predicted consumer demand change due to higher network transmission speed and expanded bandwidth, and radically challenged itself for the next consumer demand.

Netflix's transformation did not stop here. In 2012, Netflix accounted for 33% of North American's Internet traffic, and became the leader of OTT (Over-the-top) companies in the region, when it attempted its third transformation. In February 2013, Netflix released a self-produced content "House of Cards" through their own network system. This was a drastic innovation that changed the system of the VOD streaming market, where distributors and content manufacturers were previously distinguished. It was pretty risky as Netflix could harm their relationships with content producers. Nevertheless, the result was a success. After the release of the drama, 3 million new users joined during the first quarter, and in 2013, Netflix set its highest record of $3.75 billion in sales.

Why did Netflix take the risk by another radical transformation even though they were at the top? The reason is simple. They sensed the evolution of consumer demand. In 2007, Netflix started the fire and in 2008, the VOD streaming service innovation changed the preferences of consumers towards content consumption. Streaming changed the content consumption habits of consumers, from watching TV on their sofas to watching contents whenever and wherever they wanted with many types of devices such as smartphones, PCs, and tablets. This also changed the patterns of content consumption by allowing consumers to watch a whole series at once or just watching specific scenes they preferred. Netflix noticed this change, and decided that producing a content that optimizes the streaming service was necessary. Netflix invested $100 million in producing House of Cards for their new transformation in 2011. What is interesting is that in 2012, the percentage of North Americans consumers watching movies online surpassed the percentage of renting movies by DVD or Blu-ray. Netflix once again was one step ahead in consumer demand change and became stronger through their radical innovation (Figure 2).

Further, Netflix employed an open innovation strategy for its daring transformation. In the process of changing its business structure to catch up with the change of consumer demand, Netflix secured the lacking capacities through open innovation. Compared to Blockbuster, Netflix was a small-sized venture company starting in the online rental business. In order to overcome the lack of management resources and brand power, they established a strategic alliance with Toshiba, a manufacturer of DVD players. Consumers who purchased a Toshiba DVD player were given a free voucher of Netflix. This promotion increased the consumption of DVD contents and Netflix successfully secured a consumer base. Netflix established strategic alliances with film companies and hardware manufacturers as well. They allied with Paramount and MGM to procure streaming contents and with TV manufacturers (e.g., Samsung Electronics, LG Electronics) to develop HD TVs suitable for the consumption of online streaming contents. Open innovation allowed rapid procurement of required resources and facilitated the radical transformation of Netflix.

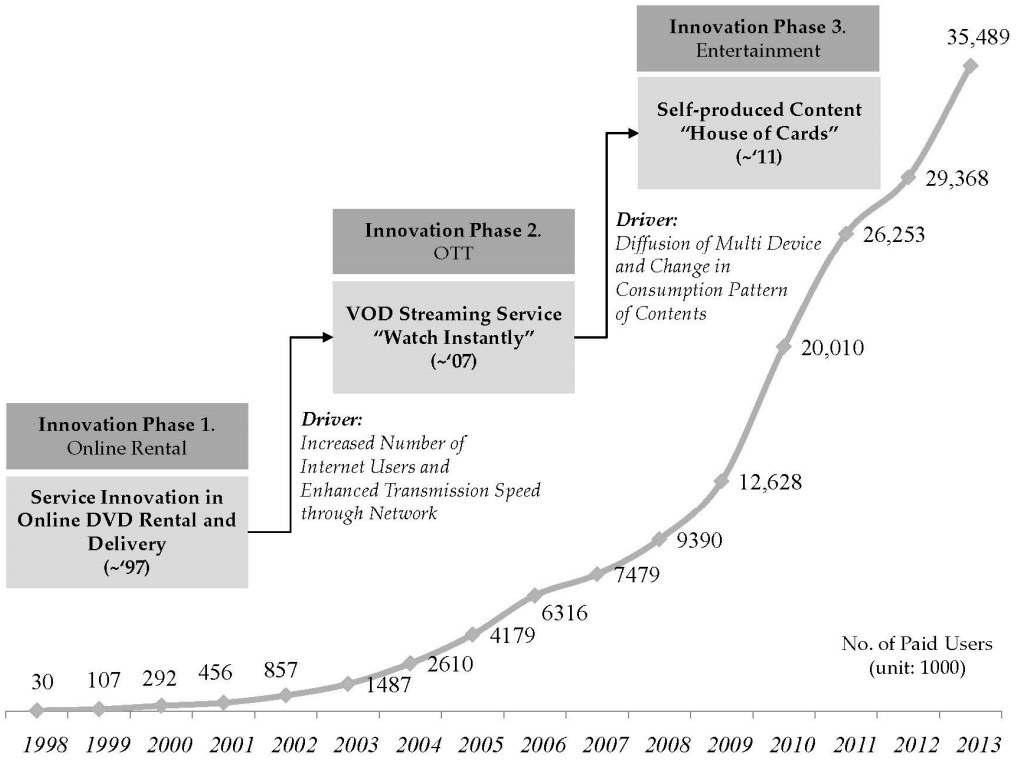

Figure 2. The three innovation phases of Netflix.

4.2. "Hidden" Demand: Discovering Potential Demand by Behavior Observation and Big Data Analysis

Accurately identifying and satisfying the potential needs and wants of consumers who are the innovation users are the keys to sustain the success. However, in most cases consumers do not clearly acknowledge what they want, or are reluctant to express their thoughts, or sometimes reply based on their memory which might be biased. According to Zaltman [42], 95% of people's thoughts take place in the subconscious mind, and only 5% is expressed through language. The consumers' needs and wants that are expressed are just a tip of an iceberg. One can take a huge step forward in succeeding in innovation diffusion if one can identify the rest of the iceberg that is underneath the surface and discover the insights. In this section, we propose to actively apply behavior observation and big data analysis to identify hidden needs of consumers and their usefulness through relevant cases.

To overcome the limitations of previous research methodologies, consumer research in the marketing field is developing an anthropological method called ethnography. This research method interprets subjects by the researcher observing their natural behavior in their daily life [36]. If the concept of "observation" is used in consumer research, the unconscious behavior of consumer can be captured, and researchers can also discover the other needs of consumers that are unexpressed or unacknowledged. Therefore, research methods based on observation can be highly useful when establishing the direction of innovation.

Let us examine some cases when innovation products were produced with systematic behavior observations and when these observations were adopted in the product planning process. Europe's largest electronic company, Electrolux, visited 1500 Swedish households during their product planning stage for vacuum machines, and observed usage patterns among housekeepers for long hours. Through this study, they found out that the weight of the vacuum machine was too heavy making it inconvenient for moving, and that small vacuum cleaners were also used together. Based on these results, Electrolux developed a light weight, cordless vacuum cleaner called Ergorapido which also could be used as a normal cleaner and a portable cleaner. After Ergorapido's release in 2004, it has reached over 9 million in sales.

LG Electronics installed video cameras in 30 households located in Delhi and Mumbai, and observed the usage patterns of refrigerators for a month to obtain ideas for their new refrigerator targeted towards the Indian market. Results showed that the vegetable storage was more valued than the meat storage as there were more vegetarians in India, so LG Electronics made the vegetable storage larger. Furthermore, with the same research method, a function that drove away mosquitoes with an electronic wave was added to air conditioners after finding that Indians were suffering from mosquitoes with dengue virus in their homes.

Along with behavior observation techniques, big data analysis is also very useful for identifying hidden demand. Utilizing data to analyze consumers was also important in the past, but deriving insights from the data was the researcher's role [43–45]. Accordingly, there existed a high risk of biased results as it could be influenced by an individual's knowledge and experience, or limitations of the sample data. However, the big data analysis significantly decreases this risk by its vast data and analysis algorithm [46]. Specifically, not only text data, but also most data types like image, behavior, and etc. can be analyzed and the analysis infrastructure like servers, handling capacity and speed also has become more common. Above all, consumer demand that used to be difficult to identify can be discovered through computers due to the development of the recommendation and prediction algorithms.

Netflix was also very adept in detecting hidden needs through big data analyses. They adopted the big data analysis from the planning stage of their successful self-produced drama, House of Cards. They invested much effort towards identifying preferred contents and watching patterns of their targets which were VOD streaming users. With their information of a daily average of 30 million watched videos, 3 million search results, and 4 million user opinions, Netflix examined the content preferences of VOD streaming users, and analyzed their watching patterns by location, device type, and day of week. Certainly, they combined their analyses with other data like social data as Facebook and Twitter, and data from market research companies. Through their big data analyses, Netflix successfully revealed the potential demand of VOD streaming users, which are indicated as the following. (1) Prefers familiar and intense stories; (2) Has much interest towards works starring Kevin Spacey or directed by David Fincher; (3) Shows patterns of watching the whole series at once. Netflix decided to remake 1990 BBC's House of Cards, and recruited the cast and the producer based on these findings. In addition, breaking away from the traditional method of showing one episode per week, Netflix released the whole season at once. The result was a success and Netflix grew into a giant media group surpassing Time Warner with 57 million members worldwide in 2014.

Amazon is showing superior ability in predicting consumer preference and tendency through big data. Amazon is using collaborative filtering which analyzes product consumption patterns among consumers who purchased similar or the same goods, which is becoming the basis of their recommendation system. A total of 30% of Amazon's sales are being generated through this recommendation system. In addition, Amazon provides a personal shopping device called the Amazon Dash which allows observing the consumption cycles of necessities which are difficult to identify online. Amazon Dash supports convenient purchase by reading the barcodes of necessities or inputting products name by voice recognition. Information is automatically recorded in Amazon's database, when a type of cereal or milk is almost all consumed and searched for. Thus, Amazon can observe when and where a product is purchased, and the cycle of consumption through data without installing any video cameras in the household. This is possible as Amazon predicts future purchases through their analyses of customer consumption cycles, previous consumption records, and basket items, and delivers these predicted products in advance to nearby warehouses even before consumers actually purchase anything. Amazing, isn't it? Through big data analyses, Amazon already knows what and when consumers will purchase before they know it.

4.3. "Goal-Oriented" Demand: Solving Their Hassles Such as Waste, Inconvenience, and Anxiety

Even if firms actively utilize behavior observations and big data analyses to discover hidden demands, it would be meaningless data if there was no direction. One must clearly understand what one wants to detect through observations and analyses to determine implications for innovation. Consumers participate in consumption to achieve a goal, and during this process, they encounter diverse hassles. This section asserts that finding these hassles and solving them are effective in setting direction for innovation [18,47].

Slywotzky and Weber asserted that a company that focuses on users' hassles can create new products or services [31]. This is because finding a way to reduce or remove hassles occurring in consumers' lives causes the beginning of the creation of attractive products. Past studies argued that in diverse areas of the ICT industry (e.g., mobile payment), consumers expect and experience hassles such as inconvenience, anxiety, risk, financial loss, the violation of privacy, and wasting time while using products [48–53]. An attempt to solve hassles such as (potential) risk, confusion, inconvenience, anxiety, complexity, and waste triggers the emergence of new products and services [31]. Among the diverse hassles, "waste", "inconvenience", and "anxiety" are identified because these hassles appear frequently in literature created in the context of the ICT industry, and are considered as especially essential for successful innovation to be sustained.

First, let's look into a case that accurately identified the "waste" hassle in money and time, and splendidly solved it. Netflix's DVD rental service was the first to allow unlimited DVD rental for a flat rate. This solved the waste of money that consumers had to deal with for late charges. In addition, Zipcar invented a car sharing innovation which solved money wastage by handling hassles like car maintenance, accident management, and insurance registration, as well as time wasted as drivers spend an average of 450 hours a year looking for a parking space. In addition, Kickstarter, crowdfunding platforms, which were mentioned earlier, showed innovation that neatly solved time and money wastes for both investors and developers. Crowdfunding eliminated the hassle of developers from printing out their idea and running around to get funding from investors, and helped investors to save time by allowing them to easily find investment items with a few clicks on the Internet.

Now, let us examine successful innovations that effectively eliminated "inconveniences" like complicated processes, difficult usage, and inefficiency. 10 years ago, Ez-Pass Network constructed an automatic toll collecting system for highways and tunnels, and solved the inconvenience of drivers having to stop their car to pay for tolls. In other words, consumers could recharge their devices with money and drive through the toll gate without having to stop and opening their windows to pay for toll. Amazon's Kindle also solved the inconvenience and complicated process of connecting PC and E-book device to download contents. iPhone improved the uncomfortable texting method and small screens for web browsing in preceding feature phones, and most of all, provided a simple and convenience interface. For example, users had to click at least 18 to 39 times to download music in previous devices, but with the iPhone, they were only 5 clicks away from enjoying music.

Let us check some innovations that solved psychological and physical "anxiety" hassles. Amazon first provided an online product opinion (facing opposes from suppliers) to appease psychological anxiety for consumers when purchasing products online. Google's driverless car is a result of a process for solving social hassles and anxiety as 1.2 million people die each year due to car accidents caused by human drivers. In addition, Google Glass could be seen as an invention to overcome physical anxiety hassles. Google Glass was initially developed to solve accidents that were occurring due to paying less attention elsewhere and not having two free hands as the usage of smartphones increased.

All these innovation cases are results of recognizing the importance of identifying and solving hassles like wastes, inconveniences, and anxieties. However, some innovations were dependent on coincidence and the intuition of genius entrepreneurs like Netflix's Reed Hastings and Amazon's Jeff Bezos. Unceasingly systematic effort towards discovering hassles and innovative solutions is necessary. Currently, some advanced companies are establishing their company culture as a process of looking for hassles and finding innovative solutions. Google's Solve for X is a representative

example. Solve for X was launched in February 2012, to share ideas and actually productize innovative technology for solving humanity and social problems. This project is led by Google's X team, and is focused on resolving problems with a team of workers from diverse backgrounds such as inventors, entrepreneurs, scientists, and so on. Some of their products are Google's driverless car and Google Glass. Google clearly recognizes that consumer hassles need to be solved in order to increase the success rate of innovation. Understanding consumer hassles, this may be the first step in becoming the chosen innovation. Table 1 describes three consumer hassles and cases. Table 2 summarizes three characteristics of consumer demand, solutions, and representative cases.

Table 1. Classification of consumer hassles and cases.

Hassle	Meaning	Case
Waste	• Waste of time and money from using products and services	• Netflix's DVD rental service • Zipcar's car sharing service • Kickstarter's crowdfunding platform
Inconvenience	• Inconvenient factors when using products and services such as complicated procedures, difficulty and inefficiency in usage • Innovation with UX perspective contributes to decreasing inconveniences	• Amazon's Kindle • E-Z Pass Network's automatic highway toll collection systems • Apple's iPhone
Anxiety	• Psychological and physical anxiety factors that occur when using products and services • Innovation relevant to preventing accidents, protecting personal information, security, and health are representative examples of easing anxiety	• Amazon's online product opinion service • Google's driverless car

Table 2. Guidelines for consumer-centric innovation.

Characteristics of Consumer Demand	Solution	Case
Evolving	• Taking daring transformations and breaking away from compromising	• Netflix
Hidden	• Discovering potential demand by behavior observation and big data analysis	• Electrolux • LG Electronics • Amazon
Goal-oriented	• Solving their hassles such as waste, inconvenience, and anxiety	• Zipcar • Kickstarter • Ez-Pass Network • Apple • Google

5. Conclusions

There was not a time when the speed of innovation was as fast as now. Leader companies that ruled the market just a few years ago are failing to sustain their success and losing competition, and new companies are rapidly growing without giving existing companies time to respond. The morning newspapers are teeming with articles about new firms like Xiaomi, Tesla, and Zipcar that are growing with frightening speed and threatening existing companies. As indicated before, this can be seen as the structural change of innovation environment due to four main factors which are the development of innovative infrastructure by ICT, more diverse investment methods, the spread of open innovation strategy, and the decrease of levels in accepting innovation among consumers. This environmental transformation is giving us a silent pressure to introduce innovations with high productivity and accuracy into the market.

As firms cannot know the future, they need to effectively invest their limited resources in the correct direction to produce accurate innovation. This article is focused on determining the direction

of innovation with respect to the innovation users to achieve this objective. Amazon's Kindle, Apple's iPhone, and Netflix's online DVD rental service are all innovative cases that support the fact that innovation is more successful when it is aimed at the consumers. In addition, three guidelines were proposed in this article. First, innovation has to change along with the dynamic and ever-evolving demand of consumers. Even if the evolution of consumer demand threatens the company's previous business, it is crucial that this is acknowledged and new innovation has to be pursued. Second, the demand of consumers is challenging to identify and even consumers have difficulty in expressing their own needs. Potential demand must be discovered through behavior observation and big data analysis. Third, the objective of observation should be focused on defining and finding consumer hassles (waste, inconvenience, anxiety), and innovation should be focused on solving these hassles. One should go to consumers and observe them to produce innovation that solves their hassles before it is too late. If this is accomplished, the company will be rewarded as the leader in a new growing market and keep it that way.

The present research provides two implications as follows. First, guidelines for consumer-centric innovation are suggested by examining multiple case studies. By analyzing cases on observation method and big data analysis, the practical usefulness of the case study methodology is demonstrated. Further, this article identified consumer hassles based on theories of consumer psychology, investigated those hassles through case studies, and proposed practical guidelines for firms. Second, the present study argues that the structural changes in the ICT industry caused the phenomenon of increased speed of innovation. Management teams in firms recognize the importance of innovation but they tend to focus on incremental improvement. By examining the case of Netflix's transformation, this article demonstrates that in response to the evolving demand of consumers, pursuing radical changes is of great importance for survival.

The directions of future research are suggested as follows. First, the present research highlighted the importance of consumer-centric innovation through multiple case studies of ICT companies. Despite an effort to study multiple cases, investigating factors such as the characteristics of consumer demand, hassles, and big data analysis using an empirical methodology could strengthen further the arguments. Second, this research focused on the identification of the characteristics of consumer demand and the solutions for consumer hassles. The inability to focus on techniques remains a limitation. Future research can improve the present study by intensively considering the techniques to fulfill consumer-centric innovation such as open innovation and strategic alliances.

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