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**Conference Paper**

# Service innovation in the drive-recorder business

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# The 19th ITS Biennial Conference 2012

# "Moving Forward with Future Technologies: Opening a Platform for All"

18 - 21 November 2012, Thailand

## Service Innovation in the Drive-Recorder Business

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**ABSTRACT: Trend toward service economy is growing even stronger in society and industry as well as each company. Frameworks of service innovation become vital not only for analysis but also for stimulating the innovation systematically.In this paper, we focus on the drive-recorder business which is comparatively niche but is evolving in a unique way as a part of transportation-telematique industry. We analyzed the drive-recorder industry. Two factors are mainly considered hereby. The first one is " consumerization " and the other "ecosystem ". Both are characteristic factors for the innovation in the sector.We also propose the framework for innovation taking account of these factors. And this framework make us possible to approach systematically toward innovation. We also evaluate and compared this framework among others.**

## 1 Introduction

In the autumn of 2011, the slump in Japan's television manufacturing industry became a major issue. Japan's manufacturing industry had lost some of its advantage, which was a contrast with the 1980s when US-Japan trade and economic friction received extensive media coverage. This loss can be explained by the smiling curve concept wherein upstream design processes and downstream maintenance services generate a higher profit margin than manufacturing processes. The manufacturing industry, which had primarily focused on manufacturing processes, such as assembly, as a profit source, was finding it difficult to generate profits in the same manner and sought change.

Servicification is one solution put forward by the smiling curve concept, as exemplified by the success of the jet engine maintenance service business launched by GE of the US which aimed at improving on-time flight performance, and the construction equipment maintenance service

business (KOMTRAX) started by Komatsu of Japan.This requires a new business model. One that would facilitate a change in the focus of manufacturing from mere *monozukuri* (product creation and innovation) to one that enables *kotozukuri* (creation of value-added services).The issue of the smiling curve concept can be addressed by adding services, which have intangible qualities, to a lineup of tangible goods and thereby increasing the value.This paper proposes an approach for the servicification of the manufacturing industry, which traditionally handled the production of goods, by pioneering new businesses that offer both tangible goods and services.

The shift to servicification is not a simple matter for the manufacturing industry, which has focused on creating products, and problems exist. A movement is being carried forward to solve these issues using service engineering. "Innovate America [1]," by the US Council on Competitiveness, proposes to promote the research of service science. Research on service science is also actively being carried out in Japan. Hidaka reports [2] on research and development trends. Suwa treats services scientifically [3] using classification, analysis, and modeling techniques, and Takeuchi et al. discuss [4] servicification of manufacturing services by analyzing the service industry. Services have unique characteristics—the most typical being the intangible traits not found in tangible goods. Research on servicification includes research on the intangibility of physical goods and also it discusses the improvement of customer value and the development of new customer value. This paper also examines servicification with a focus on customer value.

The key to lower hardware prices is an increase in the role of software and servicification. When the proportion of value-add expected by the customer increases relative to the price of an industrial product, a business' competitive strength stems from its capability to improve the value expected by the customer. Likewise, the drive recorder business does not merely supply physical goods. Accordingly, it is necessary to discuss the provision of services, in particular the value expected by the customer. Competitive strength can be enhanced by using an optimal method to achieve the value expected by the customer. Analyzing and discussing this value, and implementing an optimal method (choosing whether to create a physical good or a service) will help determine survival in intense competition. One premise in debating the servicification of the manufacturing industry is the understanding of information and communication technology. A framework to efficiently discuss new business development is crucial, as it is difficult to accurately grasp the wide range of leading-edge technology.

Based on the concept of the consumerization of information and communication technology that evolves from this, we propose the creation of many ideas and the reworking of strategies from the perspective of business ecosystems to secure the leading edge. Consumerization is the phenomenon where the latest information technology is used by business and social capital after it has been offered over the Internet. Discussing technology that a customer (the consumer) is familiar with leads to discussion of the value expected by the customer. The business ecosystem concept was proposed by taking hints from the biological ecosystem. In the biological ecosystem, living organisms develop by maintaining order in the ecosystem. Much in the same way,

companies develop by maintaining order among all corporate groups that are connected with supply chains and other entities. We propose a framework for discussion to develop a strategic plan by using the concept of consumerization to examine the new value expected by customers and positioning within the business ecosystem.

One example is the video drive recorder (hereafter drive recorders).A drive recorder is a device installed on the car windshield to record the area in front of the vehicle.In the event of an accident, the device contributes to clarifying the cause of the accident via analysis of the recorded images. In addition, they familiarize drivers with the danger of accidents by showing accident videos and help to promote safe driving. While they are becoming more common in commercial vehicles such as buses and trucks, they are still not widely used in passenger vehicles.One role of this device is to provide potent and useful information when accidents occur, and further wide-spread usage is desirable due to their importance in contributing to safe and economic driving. Drive recorder manufacturers are aiming for high performance and functionality, such as extended recording time and built-in GPS functions. However, manufacturers are moving forward with the use of general-purpose parts (mainly power supplies, imaging elements, lenses, memory, processors, collision detection parts) to reduce hardware costs, and lower the product price but competition is heating up.Competition is flaring up with other car electronics, such as radios, navigation systems, and ETC systems. Previously, car electronics were designed for a specific function and installed individually. However, standardization has blurred business boundaries, as a single car electronic device is now loaded with a number of functions.Furthermore, manufacturers from different industries are entering the market. Smartphone manufacturers have launched a new business in which a smartphone equipped with video recording capability can be installed in the front of a vehicle to serve as a drive recorder. In this manner, the business environment has become more stringent and it is becoming more difficult to carry out individual sales of drive recorders. Accordingly, a new business strategy is crucial.

# 2. Drive Recorder Business

## 2.1 Overview of Drive Recorders

A drive recorder is a device installed on the windshield of a truck, bus, or passenger vehicle that records images. Its size is approximately 10 centimeters wide and 5 centimeters high. The external dimensions of Horiba Itech's Dora Neko, which was rolled out in 2006, are 110(W) X 80(D) X 38(H)mm with a weight of 110g. It comes with a CMOS color image sensor, and 640 X 400 pixels. It has a DC12/24V power supply and a recordable CF card with storage capacity of 128MB.Image recording data was 20 seconds (fixed) at 30 frames/second. The drive recorder continuously records. Images from before and after the accident verify a number of things such as the color of the traffic light, the following distance based on time, and the lane in which your vehicle was traveling. This can serve as evidence. According to a 2006 report on cumulative drive recorders shipments, 20,000 were for commercial trucks, 1,600 for buses, 10,000 for taxis, and

26,000 for ordinary passenger vehicles [5]. The market penetration rate in 2009 was 49% for taxis and 0.1% for passenger vehicles (Yomiuri Shimbun – June 18, 2009). There are also subsidies from trucking associations, and market penetration has focused mainly on commercial sectors.

Moreover, the recordings are not only used as documented proof of accidents but are also used as teaching materials for driving safety. The graphic accident images recorded by the drive recorder increases the fear of accidents and effectively promotes driving safety, mainly by getting drivers to swear to avoid getting into an accident. The videos of accidents taken by drive recorders that are shown on the Internet as general traffic safety information impress the horror of accidents on viewers. Furthermore, by analyzing the accident video and understanding the cause of the accident, , the video can be used to take preventive measures and avert accidents before they happen.

In this fashion, drive recorders are gaining attention not only as a recording device but also as a device to promote driving safety.

## 2.2 Value expected by the customer

Drive recorder consumers preference is for lower prices, improved safety, and greater enjoyment.

(1) Lower prices: Hardware performance is being improved by extending the recording time for high definition video. Manufacturers are continuing to create more compact drive recorder units and reduce prices, putting the product in an affordable range.Overseas manufacturers that can readily reduce assembly costs that specialize in products with the single function of recording images.

(2) Improved safety: In 2008, the Ministry of Land, Infrastructure, Transport, and Tourism (MLIT) reported that drive recorders are being used in safe driving management and accident prevention. Manufacturers of drive recorders are entering the driving safety business by adding functions that facilitate the recording of speed, acceleration, rpms, and GPS functionality, in addition to the main function of recording images. For example, Horiba Itech received a bulk order for 387 drive recorders from the Japan Postal Service in 2009. The postal service is using the drive recorder system not only for recording unforeseen accidents, but also to contribute to driving safety by analyzing driving tendencies of postal delivery vehicles and as a driving diagnosis system to prevent accidents. The functions realized satisfy the needs for accident prevention, driving safety systems, drive management systems, and business use.

(3) Greater enjoyment: Consumers are starting to use the drive recorder systems maximizing used of its main characteristic, the video recording function. The purpose of the drive recorder system is not only to tape images during an accident but is also being used for more enjoyable purposes such as recording travels and uploading them to YouTube.

## 2.3 Business Environment

Currently there are two business models in the drive recorder industry. The first is business

model is based on a low-priced device with superior cost performance for general consumers, and the second is for high function, driving safety-oriented devices used for driving safety in commercial settings. Overseas manufacturers with lower labor costs tend to choose the first business model while domestic manufacturers tend to opt for the latter.

There are two trends in the infrastructure environment within the drive recorder industry.First is national policy and the second is market entry by manufacturers from a different industry—smartphone manufacturers. MLIT began developing ITS spot services with the goal of integrating vehicle navigation and ETC to realize a diverse all-in-one service. This involves using the 5.8 GHz band DSRC, which had been used in ETC for road to vehicle usage, for bidirectional communications, and adding it to basic services (dynamic route guidance, driving safety support, and ETC services) to achieve services such as billing, tourism, and logistics. In the past, car electronics were installed separately in accordance with a specific purpose. ITS spot services aim to provide a full lineup of services using the same hardware. It is expected to be the next generation intelligent transportation system, following ETC and VICS[7]. The ITS Service Promotion Association ORG is the central entity promoting the system. As of 2011, there are roughly 2,000 ITS spots. Drivers with an ITS Spot compatible device can take advantage of these services. In addition, the 700MHz frequency, which was used in analog terrestrial TV broadcasting, is likely to be made available for use in ITS. One idea being proposed that should contribute to driving safety is communication between vehicles to prevent accidents, which includes transmitting information such as the position between vehicles. The MLIT is coordinating vehicle manufacturers, device manufacturers, and communication equipment manufacturers to examine applications for use in ITS Spot services. Drive recorder manufacturers are also participating. Along with contributing to national policy by participating in the study of driving safety, operating safety, and economic driving, manufacturers aim to gain commercial systems technology and knowhow.

In addition, smartphones with built-in drive recorder functions have appeared on the market. For example, there Reco-der[8], sold for commercial use, is software that enables a smartphone with a drive recorder function, and the iDRNAV[9], which uses the iPhone to continuously record images. Smartphones have a 100% coverage of service areas and are sold in large volumes.Also, applications can be simply uploaded to smartphones, and provide abundant functions and attractive services that are not possible with a stand-alone drive recorder.

A change in business model will become necessary owing to the following factors. It has become easier to utilize information communication technology owing to the spread of the ETC and mobile phone networks and the reasonable costs due to lower prices. Also, in a contrast to rivals thus far, we are seeing the advent of new competitors such as car navigation system and car electronics, and smartphone manufacturers. This has blurred the business boundaries and increased chaos.

# 3. Servicification

As stated by the innovation dilemma [7], innovation in the manufacturing industry has become difficult. Abe [8] and Uchihira [9] discuss the servicification of the manufacturing industry by focusing on the customer's operational processes to achieve a solution to the issue of converting the manufacturing industry into a service industry and the intangible traits of services.

Nagata focuses on the value chain [10] and proposes methods to formulate new strategies. There are 4 approaches—US (Upstream), DS (Downstream), CC (Change customer's value chain), and BI (Built-in)—taken from assumptions based on a dual axis: upstream and downstream; and inside and outside the framework. A fifth approach has been added—the VW (Value Web), which is the construction of a new value chain. MPS is an example of a US approach; GE's jet engine and Komatsu's construction machinery services are examples of a DS approach; Resona and Fujitsu's Quicknav is an example of a CC approach; Shima Seiki's services for the knit industry is an example of a BI approach; and Radish Boya's direct sales is an example of a VW approach. The VW approach targets value chains that include outside organizations and targets businesses that differ from existing businesses. A characteristic of this approach is the creation of a value chain that transcends the organization and generates new value that is expected by the customer. The drive recorder is expected to evolve from a single-function product to a multi-function product, and further down the road into a system. In light of this, it is essential to carry out a broad study that is not merely an extension of existing businesses and upstream and downstream activities along the value chain, and to discuss servicification that realizes value expected by the customer.

## 3.1 Information & communication technology and servicification

Information and communication technology, the basis for service provision, is developing rapidly and penetrating society. Advances in digital information and communication technology has made available high speed, large volume data processing and communication capabilities. Drive recorders, which utilize information and communication technology, are also being largely influenced.

The switch from analog to digital technology impacts product design philosophy and implementation methods. The digitalization of computers is occurring at a faster pace. Moreover, the penetration of Internet technology into society has not only changed the business environment in the manufacturing industry, but has also changed product design philosophy and implementation methods.

Improvements in microfabrication technology, such as highly integrated LSI, have rapidly improved computer performance and induce lower prices. In addition to the expanded usage of PCs, mobile devices that utilize PC technologies, such as smartphones, with built-in performance comparable to PCs are spreading widely. Meanwhile, servers utilize grid technology to improve performance during scaleout, This creates a virtual machine with infinite CPU speed and file storage capabilities. Also, by making servers with efficient and real-time reallocation capabilities in a size that suits customer needs, lower costs were achieved. Consequently, this

environment allows small- and medium-sized companies (and venture companies) that are not equipped with large-scale computers to still provide services.

In addition, optical communications allows for the practical application of multiple technologies and achieved high speed and high volume transmissions via the backbone network service. The development of wireless communication technologies has provided an environment where devices can connect to a network wherever and whenever. Services that require continuous network connection have been commercialized and Software as a Service (SaaS) has become available at a low price thanks to reasonably priced hardware. The release of API facilitates the creation of advanced applications and established an environment that generates new ideas. In addition, owing to the spread of the World Wide Web, PCs, and mobile devices, the Internet has become a permanent fixture in our society—a system that is convenient, low cost, and useful, and which anyone can use.

These changes in information and communication technology are triggering consumerization. Consumerization was introduced as a Web 2.0 movement by Douglas Neal at CSC's Leading Edge Forum in 2001. Advanced technology is first used by companies and social capital and then funneled down to consumers after maturation. This pattern is reversed in consumerization. Advanced technology offerings are made over the World Wide Web and first used in the consumer market, after which it is used by businesses and social capital.

This is not limited to advanced technologies that focus heavily on functions. Technologies developed for enjoyment, such as expressive human interface technologies, video, and music are first offered to the consumer market. This is the key to servicification of the manufacturing industry. Technology that creates value expected by the customer entails initial offerings, not to social capital, but to the consumer market. Business development based on consumerization enhances customer value. Consumerization of the drive recorder is unavoidable, as the images it records can be used for enjoyment and as its core technologies use information and communication technology.

Moreover, expanding the application of information and communication technology triggers difficulties, should a manufacturer plan to deal with all technologies on its own.Commercialization solely using technologies accrued within one's own organization is not feasible. To achieve advanced functions, a mashup of several APIs is necessary, as well as advanced products provided by an external organization and platforms defined by an external organization. As these technologies are not proprietary, the management of third-party technology becomes necessary as the technology exists outside the company. It then becomes necessary to examine the value chain, which includes these external organizations.

Henry Chesbrough proposed open innovation [11], Don Tapscott proposed wikinomics [12], and Christensen proposed value networks [13] in discussing the integration of external technologies and value into products. Furthermore, research is being done on technology and business ecosystems to maintain intercompany cooperation by basing them on liberal relationships. The

technology and business ecosystems mimic the biological ecosystem, grouping together organizations that share the same values. This holds true for the Value Web approach, which aims at connecting external value. Marco Iansiti indicated that the study of business ecosystems is effective for value chain analysis and in creating organizational strategies [14].

## 3.2 Consumerization

Consumerization is the bottom up flow of technology deployment from the consumer to the enterprise. The traditional flow of technology in the manufacturing industry goes from enterprises to the consumer. The reverse flow causes a lack of knowhow and results in the impact of consumerization not being sufficiently evaluated.

Consumerization has the following impact on business:

(1) Business speed: While the replacement order cycle for social capital is every 10-20 years, new mobile phone and smartphone products are introduced every 2 or 3 years.The technologies used in businesses that target social capital soon become obsolete.

(2) Product design philosophy and product realization methods: Changes are required. A move away from ground-up design and manufacturing based on proprietary specifications is necessary. A prerequisite for design will be products (offered as applications) that meet industry standards (or global standards) or designs that incorporate (for example API'ing) of industry standard (or global standard) products. Changes in design philosophy and product realization methods impact business models.

(3) Network externality:Social capital is established under the leadership of the nation, and not every enterprise is able to participate.In contrast, the Internet market is open access. The number of users increases sharply if there are benefits and a large amount of capital (including the number of base stations and other factors) is invested when it is determined to be profitable.

(4) Cross-industry participation: Cross-industry competition involves players that follow different rules competing in the same arena. The arrival of an unexpected rival triggers a change to a business model with a different profit structure.

In this manner, consumerization substantially impacts business. In consumerization, the sudden arrival of a large and formidable company as a competitor (or partner) appears to create an abrupt change in the business environment. Consequently, the following issues arise. Past experience can no longer be relied upon due to differing values and perceptions. There is no understanding of the direction of technology. It becomes unclear as to what move the competition will take. R. "Ray" Wang proposes using five forces to effectively discuss working toward a solution to these issues. R. "Ray" Wang's five forces were derived from an analysis of consumer technology penetration into the corporate sector viewed from the perspective of customers and the roadmaps of leading vendors. Although each of the five forces are not independent of one another, it is likely that the creation of ideas for next-generation products can be effectively discussed as

they include consumerization, design elements are expressed from the customer's perspective, and the impact that information and communication technology has on customers has been clearly sorted out. The five forces are Mobile, Social, Cloud, Analytics and Game Theory, and Video and UC. R. "Ray" Wang's proposals are outlined below:

(1) Mobile: Ubiquitous computing, the concept of being able to utilize a computer anytime, anywhere, has reached a level of practical application thanks to the spread of mobile devices, the most common being smartphones. Smartphones serve as the entry level into ubiquitous computing, and new services are being offered that are based on the assumption of smartphone usage.

(2) Social: Highly-reliable information sources are not limited to existing media but are shifting to social media. This is not only changing person-to-person social networking services (SNS), but also internal corporate systems such as CRM which allow the sharing of customer data among stakeholders.

(3) Cloud: Cloud computing, with its dynamic configuration, is playing an important role as an infrastructure.

(4) Analysis and Game Theory: Based in scenario planning, game theory is the basis of behavior prediction and trend analysis. The accumulation of large amounts of data can be analyzed with a high degree of precision.

(5) Video and UC: Video is low cost, easy, and is evolving into an effective medium for knowledge sharing. The integration of video with email, chat, and other messenging functions has begun.

A new model for the drive recorder business was examined from the perspective of these five forces. A portion of the study is introduced below.

(1) Mobile: Obtain road conditions and link this information with the latest maps.

(2) Social: Surrounding area data and GPS coordinates

(3) Cloud: Application maintenance and management, video archiving, release of recorded images.

(4) Analytics and Game Theory: Accident analysis, traffic congestion information, and optimal operations management

(5) Video and UC: collaboration with AR and EDR

A diverse range of business ideas were created, outside the realm of the those businesses centered around recording images. Moreover, some ideas extended beyond the sphere of existing businesses.This reflects the potential to create new business ideas by holding discussions that include consumerization.

## 3.4 Business Ecosystems

As mentioned in the preceding paragraph, discussions from the perspective of consumerization generate a wealth of ideas for expanding future business potential. However, new management

issues exist. Not only related to stand-alone drive recorder units, but connected with incorporating into social capital the implementation of advanced technology and technology from other companies, the implementation of rich human interfaces, the Internet, and wireless communication. To create value expected by it is necessary to move forward with commercialization that not only involves proprietary technology and resources but where responsibilities cross over to a number of companies. Commercialization is undertaken by a number of companies that carry out activities that add value. Businesses that provide a stand alone product need to consider new and different business strategies.

Table 1 Keystone and Niche Players in Business Ecosystems

| Strategy | Definition | Existence | Value creation | Value obtained | Main focus and issues |
|---|---|---|---|---|---|
| Keystone | Proactively improve the overall health of the ecosystem and as a result enjoy sustainable benefits to the performance of the individual company. | While the influence is large, the physical presence is generally small. Occupies a relatively small number of nodes. | Most of the value creation is left to the network. Value created within the individual company is widely shared. | Value is shared with the entire network. Maintains a balance between securing and sharing value within a specific area. | Creates a platform and shares the direction for solving problems that occur within the network. The most important issue is promoting continual value creation while maintaining a balance between securing and sharing value. Another important issue is deciding which area to choose and occupy. |
| Niche Player | Cultivates a unique ability for distinguishing itself from other companies within the network | Extremely small presence individually, but occupy many ecosystem bases as a collective niche | Collectively creates a large share of a healthy ecosystem's value | Obtains the value that was created on its own | Specializes in an area in which it has or can cultivate its own ability while using the services provided by the keystone |

Marco Iansiti proposes business ecosystems as organizations that share value. Similar to biological ecosystems, the pursuit of private interests with no regard to the interest of other organizations leads to impoverishment and the ultimate collapse of the business ecosystem. Iansiti states that to remove focus from private interests, an entity should focus on maintaining the business ecosystem and aim for a healthy business ecosystem and this will lead to a successful business. In the business ecosystem, the activities of keystone and niche players fulfill a significant role in maintaining the system. Although in a limited to number of cases, Iansiti claims the optimal strategy for the organization is to root out keystones that substantially impact ecosystems and niches that trigger new innovations, and the adoption of a strategy to maintain the ecosystem. An overview of Marco Iansiti's definitions of keystones and niche players is shown in Table 1, Keystone and Niche Players in Business Ecosystems .

For the drive recorder business, it entails changing from selling stand alone devices to a business that is part of the business ecosystem. There are 2 candidates for business ecosystems. The first is the ITS being promoted by Japan and the second is the multifunction smartphone. Keystones for the former are the MLIT, the Ministry of Finance, and the National Police Agency. Keystones for the latter are Google and Apple.

The first strategy is to integrate drive recorder functions into a portion of ITS services and

contribute to the achievement of a safe and convenient traffic system. The second strategy is to integrate drive recorder functions into smartphones and trigger changes toward servicification as a new application and advanced services aimed at linking different applications. The future image of the business changes drastically depending on which business ecosystem the company belongs to. The differences between both of these business ecosystems were examined herein, the results of which are shown in "Table 2 Comparison of Drive Recorder Business Ecosystems."

Table 2 Comparison of Drive Recorder Business Ecosystems

| | | Platforms | Keystones | Niche Players |
|---|---|---|---|---|
| 1 | Drive recorders provided by specialized manufacturers | ETC, ITS<br><br>In-house developed platform<br>ETC and ITS | Ministry of Land, Infrastructure, and Transportation, Ministry of Internal Affairs and Communication, National Police Agency | |
| 2 | Drive recorder functionality implemented in applications such as smartphones | Continuous connection to the internet via iOS and Android | Google Inc. and Apple Inc. | Companies that provides services with unique characteristics |

The major difference in the comparison of these 2 business ecosystems is the existence of niche players. Marco Iansiti's analysis shows that the main role of the niche player is to spark innovation. In the former strategy, there is little potential for innovation due to the absence of niche players. There are more niche players in the latter strategy and consequently a higher potential for innovation. The former strategy is supported by national policy therefore business stability can be expected by there is greater possibility in the latter strategy of the introduction of technologies that will change the value expected by customers, including advanced technologies. Accordingly, in the servicification of the drive recorder industry, it can be determined that there is a high likelihood the latter strategy is superior given the vast opportunities to enhance the value expected by the customer.

# 4. Conclusion

Although the main function of drive recorders is to record accidents, their expanded usage is desirable as they can contribute to driving safety depending on how the recorded images are used. In addition to drive recorders, many devices are installed onto automobiles, including tachometers and car navigation systems. An EDR, which records brake and steering wheel operations, is another device that is installed onto cars. The boundaries separating car electronics and drive recorders have become blurred. Furthermore, smartphones, which are appealing and rapidly gaining in popularity, are eating into the drive recorder market. In light of this, it has become difficult to generate profits via the extension of existing businesses. It is necessary to come forth with breakthrough measures. Servicification is one possible breakthrough measure but it will not be easy to create a new business by triggering innovation. It is not realistic target individual technologies as information and communication technologies, which are the foundation for achieving servicification, span over a wide range. Hence, exploring customer value from the

perspective of consumerization will lead to the creation of new business ideas. This paper examines drive recorders from the perspective of consumerization organized based on the five forces proposed by R "Ray" Wang, and confirms the ability to effectively and systematically create diverse ideas.Other perspectives on consumerization, other than the five forces, are proposed[21] in this paper. Going forward, it will become easier to create new business ideas from the perspective of the impact arising from the development of information and communication technology.

In addition, this paper discusses what business ecosystems drive recorders are classified in. There is a potential for several business ecosystems owing to a framework provided by a traffic system, which is run by a public entity, and a framework based on mobile phone networks and the smartphone. By making these comparisons, although there is the expectation of stable business performance owing to contribution from the commercial market and national policy, it is slow to track change and there are differences in the ease of innovation. In the Value Web, an approach for cross-company value creation, the activities of keystone organizations have a substantial impact on business. A successful strategy is one that examines business ecosystems, including keystone organizations, maintains those business ecosystems to which the industry belongs, and contributes to development.

Drive recorders are connected with the smartphone business, which is a prime example of consumer products. Rather than adopting a strategy that copes with smartphones, embracing the idea of what business ecosystem symbolized by smartphones will provide numerous factors to support a decision. Each of the business ecosystems is not adversarial or conflicting. Furthermore, it is not a question of which one must be chosen. A strategy for both business ecosystems is also conceivable. One example a company can establish its foundation while contributing to national policy and, at the same time, acquiring knowledge and amassing technology, and developing services that enhance customer value for consumer devices, and via consumer networks. Business ecosystems do not have the same strong ties of a *keiretsu* affiliation but are more loose and change dynamically. A complacent strategy destroys business ecosystems. A strategy with a high success rate is one that establishes an organization that reacts sensitively to change in the external environment and tracks the evolving business ecosystem.

This paper discussed the servicification of the drive recorder industry. The opinion discussed in this paper can be applied to industries outside the drive recorder market. Methodologies based on the perspective of consumerization and observation of business ecosystems function effectively with the realization of services that utilize information and communication technology. In the future, we aim to apply the opinions herein to a different business area, and plan to discuss the acceleration of innovation using framework that promotes the smooth servicification of the manufacturing industry.

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