

Diffusion of Electronic Bidet Toilet in Japan

Case Study: TOTO Washlet

Akbar Adhiutama, Seiichi Yoshikubo
Management of Technology Program, Shibaura Institute of Technology, Japan

ABSTRACT

In the last two decades, the electronic bidet toilet in Japan has diffused to more than sixty percent of Japanese household while it has lower rate of diffusion in other countries. From this phenomenon, it is interesting to understand about the product diffusion, which focuses on the adopter categories of diffusion, the company strategies and key success factor of the diffusion in Japan. There have been many studies about new innovation product diffusion, and this paper especially examines the diffusion of new innovations on electronic bidet toilet due to its successful diffusion among Japanese household, and further became a standard fixture toilet in Japan. This paper also discusses the history of electronic bidet toilet in Japan, identifies adopter categories based on the addition of technological innovation to the product which influenced the diffusion, and the company market strategies in Japan and other countries. Finally, theoretical propositions are developed on the diffusion of innovation for electronic bidet toilet in Japan.

Keywords: Diffusion, Electronic bidet toilet, Japan, TOTO Washlet.

1. Introduction

The innovation product adopted by customer when it can provide different values from existing product. It takes time for an innovator to penetrate and diffuse into the market, to win the competition with existing products or service [1]. Diffusion of innovations and the adoption of new technologies involve a process that formally observed and also studied by behavioral sciences research [2]. The diffusion theory analyzes and explains the adaptation of new technologies and describes the process of social change. This theory has been widely used to understand technology adopter by classifying adopter based on the degree of innovativeness in five categories.

Electronic bidet seat toilet is one of innovation toilet products which successfully diffused among Japanese household and further became a standard fixture toilet in Japan. To understand the diffusion adopter categories of the diffusion and how the product can successfully diffuse to the market, this paper explores about innovation made by

the company, and how the company developed the product, so that it can also diffuse into global market.

The research paper questions are as follows. What is the difference between American bidet toilet invention and Washlet innovation by TOTO? What are the electronic bidet toilet diffusion adopter categories in Japanese market? What are the company strategies for electronic bidet toilet market in Japan and global market? What are the key factors of diffusion electronic bidet toilet in Japan? To answer these questions, this paper explores the innovation and diffusion of the product in the market.

This paper is divided into the following sections. First section, on product life cycle and diffusion of innovation, reviews theoretical side. The history of electronic bidet toilet in Japan and diffusion adopter categories is discussed in the following one. After that, market competition and business strategy, both Japanese market and global market, are also discussed.

2. Literature Overview

2.1 Product life cycle and Diffusion of Innovation

Schumpeter (1911) divided technological change into three phases: invention as the creation of new technologies, innovation and diffusion as the spreading of new technologies [3]. An innovation (idea, practice, or object) is not objectively or absolutely new, although it is perceived as new by individual adopters [4]. In the early stage of development, a prototype is developed and tested to make sure that the product specifications are matched and the performance parameter achieved. At this stage, the product has not met market needs and has no wealth value. The second phase is the product launching phase, followed by the growth phase; there are increases both in supply and demand. In mature stage, as product is diffused to the market and the market already saturated with well established technology, the growth rate becomes slow down [5].

Traditional diffusion theory describes that diffusion of innovation is a social process of communication when potential adopters become aware of the innovation and influenced to adopt the innovation over time [2]. Diffusion researchers have described social system by social structure, system norms, opinion leaders and change agents, type of innovation decision supported and consequences of adoption. Rogers (2003) described diffusion process as a process in which communication is communicated through channels overtime among the member of a social system. The speed of diffusion is measured as the number of member social system who adopts the innovation in the time period.

Rogers (1983) also described innovativeness as the level to which an individual or other unit of adoption is relatively earlier in adopting new idea than other members in a social system. He also

proposed that adopter can be classified into five categories: innovators, early adopter, early majority, late majority and laggards (figure 1). There is around 2.5% of adopter which called innovator. They are venturesome and educated people which have multi source of information and a risk taker. They use technology for their own and motivated by as a change agent in society. This type of adopters are willing to tolerate initial problems that may accompany new products and willing to make shift solutions to such problems.

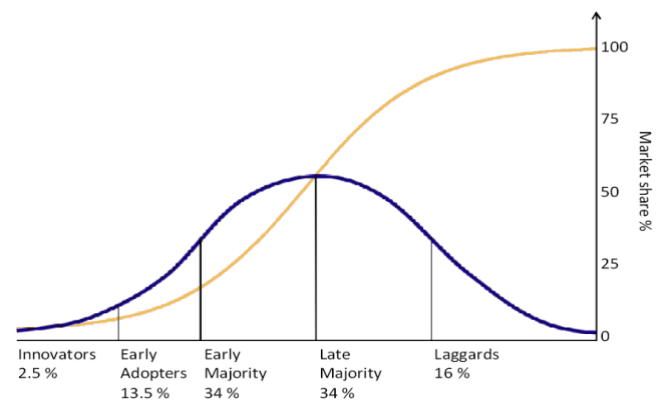


Figure 1. Diffusion of Innovation Adopter Categories

The 13.5% of adopters are “Early Adopter”. Rogers described early adopters as respected people which have more years of education than later adopter, more likely to be liberated, have a higher social status and have a greater degree of upward social mobility than late adopter. They are visionaries in their market and looking to adopt new technology to achieve breakthrough. They are attracted by high-risk, high reward projects and are not very price sensitive because they focus on great gain from adopting new technology.

Early majority adopter category is around 34% of adopters. They have many informal social contacts and motivated by evolutionary changes. In this stage, adopter creates a landslide in demand, the firm

becomes the market leader and the transition stage occurs rapidly. There is the rapid increased in the number of firms which raise products supply in low prices and leads to increase sales. The increased of new entry in the market contributes to the diffusion of innovation.

Another 34% of adopters are the late majority. These adopters are skeptical, traditional and have lower socio economic status. They are very price sensitive and require completely preassembled and need proof. They are cautious about innovation and reluctant to adopt until most others in their social system do so first. There must be strong pressure from peer to adopt innovation. The last 16 % of adopter is the laggards. These adopters are traditionalist and the least to adopt an innovation. They are fixated to the past, not believe on technology, and all decisions must be made in terms of previous generations. An innovation which adopted by the laggards may already obsolete by more recent ideas already used by innovators. Laggards are likely to be suspicious not only for innovator, but for innovators and change agent as well.

3. History of Electronic Bidet Toilet in Japan

3.1 American Bidet Toilet Invention

The history of bidet toilet in Japan was started in 1964, when TOTO imported Wash Air Seat product from American Bidet Company for sold in Japan. The Wash Air Seat was a combination product between flush and bidet toilet which had a nozzle to spray warm water, heated seat and blew warm air to dry purpose. In America, this product was designed for aging people and hospital patients who had difficulties in using toilet paper. Besides helping patient in medical procedures, bidet toilet could raise the people dignity by prevent poor hygiene.

Hygiene may also be difficult for persons with movement and mobility impairment [6].

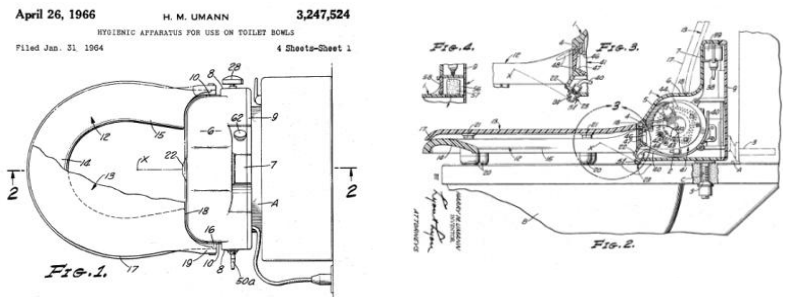


Figure 2. H.M Umann patent right (Source: United State Patent Office)

3.2 TOTO Electronic Bidet Toilet Innovation

Innovation is the development of invention and exploitation of invention into commercialization to the market [7]. Wash Air Seat has features such as heated seat, air blower, water heater and bidet nozzle. When TOTO still imported Wash Air Seat, company found some problems in this products such as lack quality of water temperature control, not a user friendly product and already broken after used around several months. The price product at the time was expensive for Japanese market. This product used manual control system by switch on and off system for the water heater which made the warm water condition was unstable and toilet was easily broken.

Around late 60's, Japanese Trading Company in association with United State found an US patent application and suggested this company to buy the patent right of hygienic apparatus for toilet bowl. The patent right belongs to Harry M. Umman which registered in United States Patent Office in 26 April 1966 (figure 2). Based on this patent right, in late 1970s, this company decided to create its own bidet toilet product called Washlet. The innovation in this product was focus on the electronic control system to control water heater, heated seat, air blower

and nozzle. Based on this innovation, this company commercialized it and become the first mover in Japan electronic bidet toilet market.

4. Diffusion Adopters Categories

4.1 Diffusion for Innovators

Around 1980, this company's R&D successfully developed automatic electrical control by using integrated circuit to control water temperatures, nozzle system, warm air blower and heated seat in Washlet. This innovation of electronic control system was the revolution of technology fusion between ceramics and electrical device in Japan [8]. Around that time, Japan was in the era of R&D in development and application of integrated circuit experiments.

When this product introduced to the market 1980s, there was challenge to convince the Japan market to accept technological toilet product. In this early stage, the market size is very small and prices of these products are too high for customer. The customer bought it for medical purpose and the curiosity of the new toilet product concept. The customer segment mainly at the first time was hemorrhoid patients and post delivery woman. The company was success in electronic bidet toilet market when Japanese market recognized this product from its commercial promotion around 1980s. The market approach by commercial promotion to create market awareness has made the company success in diffusing the product to Japanese market. At that time, not only this company introduced electronic bidet seat, other Japan toilet makers such as Inax with its bidet toilet also competed in this market.

The company tried to penetrate the market by strengthening the marketing chain with Japanese plumbing firms. To promote the product, the company lent this product to plumber families to use and experience it in trial time periods. Another way to increase

public awareness of the products is by installed this bidet toilet seat in some public spaces which gave opportunity to the people to experience the product. The company also spread the Washlet Map to give information to the public where they could try it freely. Japanese plumbing firms could influence others through interpersonal communication as opinion leader. The opinion leaders can influence their peers in many ways, first, as an inspiring role model; second, by spreading product knowledge using word of mouth and third, by giving advice and verbal direction for search, purchase and use [9].

4.2 Diffusion for Early Adopter

In 1985, TOTO Company developed its own plastic technology based on structural analysis improvement. Around this year, the hot water heater tank material was changed from copper material to nylon resin. Based on the information from company's marketing division, most of the customer's complaints about the product were its quality, but only a few complaints in price and product usages. Most of the customers asked to repair the product and willing to continue in using this product again. Based on this condition, this company saw it as an opportunity and potential market demand in the future. The early adopter adopted this product as a new technological lifestyle.

In this phase, Japanese market recognized TOTO brand as a manufacturer of electronic bidet seat after the successful commercial campaign: "Even your buttocks want to be washed" which was thought by copywriter Takashi Nakahata in 1982. This campaign became very famous by the TV commercial which showed Japan actress, Jun Togawa as a commercial model (figure 3). The product marketing which used TV commercial advertisement in 1980s was one of its success factors to give Japan customers the knowledge stage of new product. The product marketing was to develop public awareness of new life style in washing the back side with water to improve people

hygiene. In the beginning of the promotion, the company used unique tag line which raised people awareness of the product. Most of customers decided to buy it after they already had experience to use.



Figure 3. Washlet commercial TV campaign in Japan 1982 (source: TOTO)

4.3 Diffusion for Early Majority

In this early majority stage, the number of bidet toilet seat supplier in Japan increased, which made high diffusion to the market. In around 1992, this company launched ozone deodorization technology as a respond to market demand in reducing toilet smell. Around this year, Washlet shipment was gradually raised around 4 million packs shipment. In 1996, this company developed water efficient technology which called “sequential valve system”. In this year, the product used Al_2O_3 material in instant hot water tank. At this time also, the shipment increased from 4 million packs into 9 million packs shipment.

Customers could choose many types of electronic bidet toilet seat which available in Japanese market. In this stage, the technology features which provided by each product are almost same. Around 1995 to 2002, there was an increasing penetration of electronic bidet toilet within Japanese household from 24 percent to 47 percent. The increasing of supply in bidet toilet seat market had made the price reduced and the number of installed products in household increased. In 2003 (figure 4), there were around 60 percent of households in Japan were equipped with such high-tech seats (Japan Times, 2007).

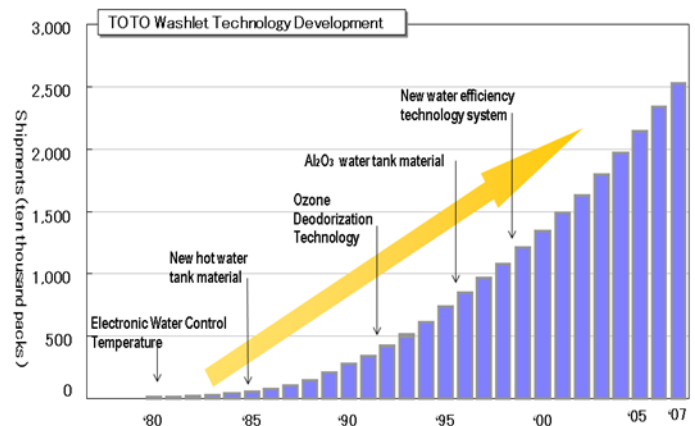
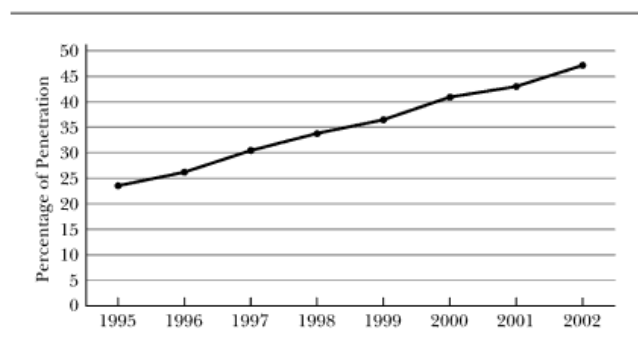


Figure 5. Washlet Technology Developments (Source: TOTO)



Source: Adapted from Economic and Social Research Institute, Cabinet Office (2003).

Figure 4. Penetration of Electronic Bidet Toilet in Japanese Household

Beside G types and S types, this company continued to develop new bidet toilet type series. In 1991 it launched the Z series to the market, which was the integrated toilet type. In 1999, this company launched new product which called Apricot. As a respond to end user demand to have warm water all the time, this company applied new water efficient usage technology system which called “wonder wave cleansing system”. This water system alternates strong and weak pulse of water, more than 70 times per second, achieve outstanding cleansing which uses approximately one-third of water required from earlier products, and cuts

electricity needed to heat the water by half. The product shipment packs reached around 13 million packs each year (figure 5).

5. Bidet Seat Market Competition

5.1 Bidet Seat Toilet Market Competition in Japan

In Japanese toilet market currently, there is high competition among toilet manufactures to provide consumer's needs with more comfortable and easy to use toilet. Most of the Japanese toilet makers develop new product with environmental friendly features such as low water and electricity consume. Beside TOTO who has more than 60 percents Japan toilet market share, there are other companies in electronic bidet toilet seat market such as Inax Corp, Matsushita Electric Industrial, Sanyo Electric Co, Toshiba Corp, Hitachi Ltd and Panasonic.

The standard innovation technology features in Japan electronic bidet seat toilet are warm toilet seat, nozzle water spray system, self cleansing nozzle, warm air dryer system, deodorizer, flushing system, user sensor, soft closing toilet cover, remote control, energy saving, anti bacterial material, MP3 player and easy to attach. Most of the technology features in electronic bidet toilet are typically same, where each company shows its competitive features to market. These manufactures not only compete in Japan domestic market, but also in overseas market.

In Japan competition, companies mostly imitated and emulated each other. The rivals offer almost same features and services, employ all channels and match one another plant configuration [10]. This condition affects the innovation products to be mature quickly in the domestic market. The company's R&D must develop new innovation product which could win market competition, and prepare the next generation innovation for the next market competition in the global market. The important

determinants of a company success are technological innovation and the ability to reflect market needs. The barrier against competition is not always by the level of innovation but also the quickness of customer in realizing new products, and the shorter time frame degree than the competitor [11].

The strong brand name of toilet product among Japanese household has made this company reached a large market share. It won the electronic bidet toilet market competition as the first mover. Understood the customer needs and created innovation products based on the needs, made this company being accepted in the market. Another factor such as the way to approach customers also has the important role in diffusion bidet toilet in Japanese market.



Figure 6. Bidet Seat Toilet global competition

5.2 Bidet Seat Toilet Global Market Competition

Today in global bidet seat toilet market, TOTO faces many competitors from Japan and other countries. The Japanese competitors in global competition are Inax and Matsushita Manufacture which promote high end products. An American company from San Francisco, Brondell, also launched high tech toilet product. European toilet maker, Kohler, promotes its high tech toilet with cleansing function, heated seat and warm air dryer. From South Korea, Hyundai Company, also promotes electronic bidet toilet seat (figure 6).

6. R&D and Quality Control

6.1 Research and Development

Since 1980, company's R&D already developed technologies such as electronic water control temperature, new hot tank material, ozone deodorization technologies, Al₂O₃ water tank material and water efficiency to stabilize the warm water temperature. As an innovation product, Washlet has three main technology features such as water controller, warm seat and deodorizing. The innovation in this bidet toilet is continued by adding comfortable electronic features to the product like electronic sensor and MP3 player.

6.2 Quality Control

By applying such programs like Total Quality Management, time based competition and benchmarking, companies have changed to perform activities in order to raise efficiencies, improve customer satisfaction and achieve the best practice [9]. To maintain total quality control, Washlet molding process is controlled by professional skill worker, and uses automatic injection molding machines which automatically work in 24 hours. Beside automatic inspection, the company uses numerical visual inspection in production. In assembling process, each worker attaches 400 points parts controlled by special staffs with high technology standard inspection. This product equipped and transported by high quality safety standard from factory to the customer.

The information of product failures during manufacturing and selling are collected. From this information, company develops new product and improve the existing product. Based on long experience and scientific basic, this company will check its long term reliability product by carrying out accelerated test. Basic technology is the origin of the product development and only good quality product can be developed and commercialized. In development stage, every

possible failure which could occur in the future and how customers used the product is monitored.

7. Business Strategies

7.1 TOTO Japan Market Strategies

The company missions are to develop products which can be used daily by people at any ages, comfortable and also for disable people by applying universal design product concept. This company also has goals which are to protect natural environment by create products with environmental friendly features such as water conserving product, energy saving and other environmental technologies. Current Japan market trend faces global financial crisis which originally come from United States. Demographic change and economic impact from global crisis made new housing in Japan remained stagnant, while this crisis also creates low demand in remodeling segment. As Japan economic starts to recover, this condition could be continued until middle of 2010, which caused by the pace of global economic recovery that also will be slow [12].

TOTO domestic market strategy focus on new housing and generate remodeling segment demand by propose comfortable and eco-friendly product. In remodel segment, housing and apartment usually belong to 60 years old person and above. In new housing segment, the target is new housing and apartment which belong to new family. Second market segment is non residential facilities such as office, hotel, school, hospital, store building and factories. Since 1960, the company already developed conserving water system in toilet tank from 20 liters to less than 5 liter water consumes. This company proposed high end toilet product such as Neorest with Hybrid Ecology System and also Apricot which is the latest type of detachable bidet toilet seat. To meet customer life style and create demand in remodeling segment, this company strengthens its

network by cooperating with remodel club store.

7.2 TOTO Global Market Strategies

TOTO started its global market in 1977 with the establishment of joint venture companies in Indonesia as a manufacturing base and continued to penetrate into market for more than ten countries in the world. This company created Five-Polar global structures which consist of Japan, United States, Europe, China and Asia Oceania. In the global market strategy, this company continues to promote new life style with toilet bowl and bidet toilet product. To enter the global market, this company also faces government regulation in many countries, which have limited standard of water consume for the toilet.



Figure 7. TOTO Zoë Washlet by American Designer

7.2.1 United States Market Strategies

This company entered to United States market in 1990 by established TOTO KIKI USA, Inc. In United States, this company faced low demand in sanitary ware and housing construction which caused by the worst American economic recession. In this country, the company promotes superior toilet product which have less than 5 liters water consume as a respond to the Energy Policy Act in 1992. This regulation only allow to 6 liters water consume in the toilet product. To penetrate market, this company

overtaking one of two major toilet manufacture in United States. The product positioning in United States is focus on middle up class market segment. United States market is used as a base point to penetrate South American market. This company also developed Zoe Washlet in 1995, a new design of bidet toilet which designed by an American designer (figure 7).

7.2.2 European Market Strategies

In European region with mature toilet market, this company provide high functionality product such as Washlet and other top level design to show the state of the art technology such as eco-friendly and water conserving technology. These products promote new lifestyle and new unique plumbing culture from Japanese to European market. In this region, the company has a goal to stimulate new market and accelerate business speed by establish European headquarter and create partnership with European retailers, hotels and public spaces. By participating at International Sanitation and Heating Exhibition 2009 in Germany, this company created awareness of its product by catchphrase “clean technology”. To align with European culture and sanitation regulation, this company created an organic contoured Washlet with Italian designer (figure 8). This company collaborates with European toilet wholesaler, toilet trade, architect and specialist to increase market sales in Europe region.



Figure 8. TOTO Washlet by European designer

7.2.3 China Market Strategies

The impact of United States economic recession creates economic slowdown condition in China and other Asia Countries region. Company strengthens its business in China's new developing cities. In this country this company focuses on luxury toilet market segment. This company also targeted high end hotels and office building. Other places in China are various landmark buildings such as Beijing National Museum, Shanghai World Financial Center and Beijing Capital International Airport. In China, this company competes with Inax in rapid construction projects and growing market in high tech toilet segment. The product failure in China market also happened when the company recalled more than 180,000 Washlet type Z for free repair based on report of 29 units in Shanghai China (Asahi Shimbun 2007).

7.2.4 Asia Oceania Market Strategies

In this region, the company focuses on market booming in India and Middle East. This company established Asia Oceania Headquarter in Singapore to oversee strategic planning and promotion. In Thailand and Indonesia, this company enhanced production and distribution system. In South East Asia region, the company built bidet toilet manufacture factory in Malaysia. The electronic bidet toilet seat market sales in this region are still low which caused by low economic growth and low sanitation infrastructures condition. In this region, this company joined the sanitary exhibition and established showroom in each country to increased awareness in the market.

8. Key Success Factor of diffusion innovation electronic bidet toilet in Japan

The most important thing in diffusing product to the market is an innovation development. Rogers describes that the innovation which perceived by individuals as the thing that has greater relative advantage, compatibility, trial ability, observably and

less complexity, will be adopted more rapidly than other innovations [13]. In the beginning of diffusion, most of user demand for superiority technology, functional performances and interested in practical utility [1]. Compatibility and standardization of technology are also important in diffusion innovation. Many researchers argue that innovation is the result of deep understanding of the market and user need. It needs strategy to be close to customers, to create business strategy and market linkage. To create competitive advantage, innovation products must reflect customer needs [10]. In competitive condition, not only innovation level is the important factor to win the competition, but also the speed to create innovation products.

Most Japanese innovation is the exploitation of western invention becoming new innovation that accepted in the market. The fast mover company with good approach to the market will gain the advantage of innovation. This innovation product will be diffused to the market and followed by other differentiation products, which will create lower price in market. In contrast, in Japanese market with high competition, a company who has successfully introduced new innovation product to the market will be easily followed by competitors who imitate the product.

Proposition 1. The product innovation development will increase rapid diffusion of innovation

People need a lot of information both factual and attitudinal, to reduce uncertainty in diffusion of innovation during diffusion process [14]. To create initial knowledge of innovation product, mass media channels and interpersonal channels are more effective in forming and changing attitudes, and also influencing people to adopt or reject [13]. Marketing and distribution can also create barriers for competitors to enter again and

serve to magnify the advantage of technological leadership [10].

In the case of TOTO Washlet, marketing and distribution system also the effective way to win the innovation market competition. The network with the plumbing firms and commercial advertizing are the effective ways to increase the diffusion of the product. Cooperation with remodel club store is also an effective way to create demand and meet customer lifestyle as one of the innovation sources. The adopter categories in electronic bidet toilet diffusion in Japan showed that innovators in Japan are people who seek electronic bidet for special purposes such as hemorrhoids patients, postpartum delivery woman and elderly people. Early adopter started when this company promoted using TV commercial, which can increase awareness and curiosity of the product. After the company won the early adopters, it continued to win the early majority adopter by adding new innovation technology such as deodorization.

Proposition 2. Marketing and network chain will influence the raising of rapid innovation diffusion.

One of the important factors to increase diffusion is the price of new products. The increasing of demand in the market stimulates company to increase the production, which causes reducing in price. The popularity of the product and the growth of demand can create new competitor which will also influence the diffusion of innovation [1]. The electronic bidet toilet seat became economical product which accepted in most Japanese household, and the price decreased because many Japanese electric companies enter this bidet toilet market area. When technologies of the products are almost same, each company has to get close to the customer need, in order to be a leader in this competition. In the case of TOTO Company, after few years of the introduction of new type electronic bidet toilet to the Japanese

market, it could easily followed by other electronic companies as competitors such as Matsushita, Panasonic and other electronic manufactures.

Proposition 3. High competition in a new product stimulates the rapid innovation diffusion.

In diffusion process, it is important to understand carefully the user behavior needs to help marketers have a potential buyer as a better target in promoting their products [15]. Culture is a part of knowledge stage, where the innovation product that can change human basic lifestyle, sometimes needs time to be adopted by customers [16]. By understanding social and cultural factor, company could create new innovation products. The diffusion of the product will be slow in the heterogeneous society, on the other side, homogenous society creates high diffusion of innovations. If the new product compatible with the values of society, it would be easier to diffuse [1].

To responds the demographic changing in Japan market and the increasing of environmental concern, TOTO company provides innovation products which focus on generate remodeling segment demand, that promote eco friendly product. Innovation is one of the strategies to win market competition and the company awareness of customer needs plays important role in innovation. In the world wide market competition, environment concern of the water saving and energy consume are the major needs of the global market. Since each country has different diffusion characteristic, it is important to understand the customer need and how to approach with the customer.

Collaboration with well known local designer to develop new product, participation in exhibition and network creation with local architects and market chain are important factors to penetrate this global competition. There are also different strategies based on local market

characteristics. When USA, Europe and China market struggle with global crisis, the lack infrastructures condition has made electronic bidet toilet seat could not diffuse to the emerging Asia market. From this company, we learned the importance of establishing Joint Venture Company in overseas, to strengthen the global market chain. To increase product awareness to the new global market, it is also important to joint international exhibition and establish showrooms. Innovation design by collaboration with local designers is also important to penetrate market and compete with local competitors.

Proposition 4. Understanding social and cultural factor can improve the fitted product which can enhance the fastness of innovation diffusion

9. Summary

The diffusion of electronic bidet toilet in Japan started when Japan developed American invention of bidet toilet into new innovation bidet toilet. The diffusion of this product increased and could be described in adopter categories. The company had different strategies to promote bidet toilet in Japan and global market to diffuse the product.

The American Wash Air Sheet was an innovation bidet toilet which had features such as warm seat, water heater for warm water, air blower and bidet nozzle. To operate this product, user must turn on the electronic switch system to control the heater. This operating system has made unstable water temperature condition and easily broken after operated in few months. TOTO R&D developed new electronic bidet seat which had electronic controller using integrated circuit which called Washlet. This electronic system could automatically control the water heater to create a stable water temperature condition and other features. Based on this control system, the company's R&D

continues the innovation which later became the standard electronic bidet toilet in Japan.

The electronic bidet seat adopter categories in Japan are defined by Rogers' adopter categories. The innovator which use the innovation product for themselves are people who seek the new innovation, senior people, hemorrhoids patient and post partum patient. The early adopter of this product increased when there was a TV commercial which raised people awareness to the product and decided to buy. The number of early majority climbed when the company launched deodorization technology in bidet seat product. To respond the costumer need, the company introduced new product called Apricot which had many innovation features.

TOTO strategies for bidet toilet market in Japan are focus on the new housing and remodeling segment. Most of the product provides innovation features for comfortable and environmental friendly. The company also proposed the high tech bidet toilet types such as Neorest and Apricot. To strengthen the distribution network and generate new demand in remodeling segment, the company cooperated with remodel club store, which made company closer to the customer needs and create new innovation products.

To manage the global market, TOTO creates Five-Polar global structures which consist of Japan market, USA, China, Europe and Asia Oceania market. The company focuses more on American market and growing market in China. In America, the company focuses on low water consume product which provided by Neorest product. To get close with American customer style, the company promotes Zoe Washlet which was designed by American designer. In China, the company focuses on the new city development project and high class market segment. In European market, the company faces the mature market of toilet. To increase the awareness of the product in European market, the company joins international toilet

exhibition and creates new design of electronic bidet toilet which design by European designer. In Asia Oceania countries, this company focuses on distribution network.

To win the market competition both local and global, the company continues to develop new product based on market needs. The key factors of diffusion electronic bidet toilet in Japan are first, product innovation development which will increase to rapid diffusion of innovation. Second, marketing and network chain which will increase diffusion of innovation. Third, high competition in a new bidet toilet product will increase rapid diffusion of innovation. Fourth, understanding social and cultural factors will also increase the diffusion of innovation, especially in the global market diffusion.

10. Limitations and future research

There are a few limitations in this research. First, due to the limited data, this paper only focuses on a company, when it should have another data from other companies to compare the diffusion of the same type of products. Second, it needs data analysis based on statistical analysis to describe the diffusion variables in the market. Third, the comparison of electronic bidet toilet diffusion in some different countries is needed to show the different diffusion type and adopter categories.

Acknowledgement

Author would like to sincere thanks to Mr. Yoshiku Tanimura from TOTO Japan, for responding us in discussion and interview.

References

Park S and Yoon S.H, Separating early adopter from the majority: The case of Broadband Internet access in Korea, *Technology Forecasting & Social Change* 72, 301-325 (2005).

E. Rogers, *Diffusion of innovation*, 5th Edition. New York: Free Press (2003).

W.B. Arthur, *The structure of invention*, *Research Policy*, 36(2), 274 (2007)

R.B. Trelease, *Diffusion of Innovations: Anatomical Informatics and iPods*, *The Anatomical Record (Part B: New Anat.)*, 289B, 160-168 (2006).

Khalil T, *Management of Technology: The Key to Competitiveness and Wealth Creation*, McGraw Hills, (2000).

C.W. Mann, *Smart Technology for Aging, Disability, and Independence: The State of Science*, Wiley, John & Sons, Incorporated (2005).

Roberts E.B, *Managing Invention and Innovation*, Industrial Research Institute, Inc, 2007.

K. Fumio, *Emerging Pattern of Innovation: Sources of Japan's Technological Edges*, Harvard Business School Press (1995).

Chau P Y.K and Hui K L, *Identifying early adopters of new IT products: A case of Window 95*, *Information & Management* 33, 225-230 (1998).

Porter M.E, *What is Strategy?* *Harvard Business Review*, 63 (1996).

Orihata M and Watanabe C, *The interaction between product concept and institutional inducement: a new driver of product innovation*, *Technovation* 20, 11-23 (2000).

TOTO Corporate Report 2009, TOTO Company.

Rogers E.M, *Diffusion of Preventive Innovations*, *Addictive Behaviors* 27, 989-993 (2002).

Zhang. M and Wei L, Knowledge, Attitude, and Home Internet Adoption in Rural China: A Case of Hubei, *China Media Research*, 5(4) (2009).

Huh Y.E and Kim S.H, Do early Adopters upgrade early? Role of post-adoption behavior in purchase of next generation products, *Journal of Business Research* 61, 40-46 (2008).

S. Dunphy and P.A Herbig, Acceptance of Innovations: The Customer is The Key!, *The Journal of High Technology Management Research*, 6(2), pp 193-209 (1995).
