The Barriers of Innovation Adoption on Urban Household Sanitation in Indonesia

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***Abstract*— The purpose of this paper is to understand current variable that significant as barriers of adoption both non electronic and electronic bidet toilet seats in Indonesian middle economic income household. Eleven barriers of adoption and open question were tested with demographic variables in Jakarta middle economic income households. The variables measured are tradition norms, existing usage pattern, physical risk, economic risk, functional risk, infrastructure risk, invisibility risk, bathroom design risk, information access, priority need barrier and climate related features. The descriptive mean, correlation and qualitative approach were use to understand the barrier factors related with adoption the product. The results showed that priority need barrier, information access and existing usage pattern are the main barriers to adopt the products. Using random sample in Jakarta urban households, this study offers a deeper understanding of barrier adoption innovative household sanitation product**

***Index Term*-- Barrier of innovation adoption, innovative bidet toilet seats, urban households Indonesia.**

I. INTRODUCTION

The economic recovery from South East Asian economic crisis in last decade creates economic income with emerging middle class urban population in Indonesia [21]. The growth of this class has impact in innovation products demand to enhance their life style. As they search for growth, multinational corporations with their innovative products enter the emerging markets [16]. The developing countries become attractive for global market since the market decline in the US, Europe and other developed countries [20]. This social class can adopt a new innovative product easily, which could enhance the value of their daily life. Although there are many innovative electronic products that already adopted in the households, innovative bidet toilet seats has yet to be adopted in the households.

One of the master pieces of innovation application in sanitary ware is an electronic bidet toilet seat. The product already advance developed by Japanese toilet manufactures and successfully diffused among Japanese household and further became a standard fixture toilet in this country. Around 1980, one of Japanese toilet company's research and development successfully developed automatic electrical control by using integrated circuit to control water temperatures, nozzle system, warm air blower and heated seat into toilet seat. The innovation of electronic control system in the toilet was the revolution of technology fusion between ceramics and electrical device in Japan. In around 1992, ozone deodorization technology was launched as a new feature to respond market demand in reducing toilet smells. The product has been developed with ecology innovation and new water efficiency 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 in earlier products and cuts electricity needed to heat the water by half. It illustrates human's tireless inventions in finding ways to achieve the much-desired alienation from the matter [2].

Both electronic and non electronic bidet toilet seats have already been introduced to the middle-class urban population of the Indonesian toilet market as an alternative way for conventional back side cleansing. This product is already used by international hotels and selects number middle and upper-class households in Jakarta, which have already showed concern with providing comfort in using toilets for customer and household families. For technology to be successful, the customer must accept it. It must be easy to use, convenient to use and must give the consumer the feeling of control [25]. The new bathroom design trend in middle and upper-class residences in Indonesia already changed from wet to dry bathroom type. The toilets in the majority of middle-class homes are flush toilets and some households still use squat toilets. To clean back side with water, most of the flush toilet equip with water spraying mechanism for cleaning purpose and in the case of squat toilets a water dipper is used. However, even in the dry bathroom type, water sprays are still use for cleaning which could make the dry bathroom damp.

The toilet behavior for cleaning purpose by using water spray and water dipper usually uses plenty of water. This behavior could raise water cost and water shortage especially in most populous city such as Jakarta. The Jakarta population continuously increased, based on Indonesian Statistic Bureau, the city population is more than eight million inhabitants (BPS Indonesia, 2010). The clean water scarcity also became the major problems in this city while most of resident depend on water source from deep and shallow well [3]. Besides using

plenty of water, using left hand to do anal cleansing has hygiene risks. Even anal washing is not restricted to specific religions or countries of the world, as a country with most populous Islam population, anal cleansing using left hand and water is a part or ritual activity in the Islam religion. The anal cleansing is necessary following defecation in order to remove feces from the anal opening. This activity has a risk where around 1.4 billion humans are infected with round worm *(Ascaris lumbricoides)* (WHO, 2004) is a major concern for hygiene specialists, thus making anal cleansing one of the more relevant issues [18].

Numerous studies have been conducted on the adoption of innovative products in society and on behavioral intention regarding it. Nevertheless, very little research exists on the people's perception and behavior toward adopting advanced technological toilet in their households. The sales of the product is very small, and the reason why people are, or are not, interested in adopting the product is far from being completely understood; there have, however, been minor studies conducted on innovative toilet adoption in Indonesian urban houses. Therefore, we attempt to study people's barrier toward adoption innovative toilet. The objectives of the study are to describe people behavior related barrier to adoption innovative toilet and to indentify the important keys barrier variables that could be use as the main barrier of adoption the products in Indonesian urban households. An understanding of the barrier factors involved in adopting the products would help the toilet makers better improve their product development and their approach Indonesian customers.

II. Theoretical Framework

Adoption is defined as "a decision to make full use of an innovation as the best course of action available" [17]. Furthermore, Rogers aware that the adoption of an innovation is not a straightforward process and that innovation often fail to pass the tipping point, i.e. the point at which critical mass is reached and the diffusion process takes off, reaching not only the innovators and early adopters but the early majority as well [5]. M. Kleijnen et al., 2009 describes that innovation resistant can be defined in three distinct types of customer behavior: rejection, postponement, and opposition [11]. He defined rejection as simple lack awareness or ignorance about the innovation on the customer's part. Postponement is a process where even customer found an innovation acceptable in principle, they may decide not to adopt it at the point of time and decision is not final. Opposition is the process when customer may be convinced that innovation is unsuitable and decide to launch an attack or sabotage.

Ram and Seth (1989) described that there are two main sources of resistance to innovation exist, functional barrier and psychological barrier [11]. Kleijnen et al., 2009, describes the drivers of consumer resistance from literature review such as tradition and norms, existing usage pattern, perceived image, information overload, physical risk, economic risk, functional risk and social risk. Traditions and norms is inherited body of customs and beliefs within a relevant social context. Existing usage patterns is related with habitual behavior formed when using a product frequently over a long period of time. Physical risk concerns that the innovation might be harmful, unhealthy of cause injury. Economic risk concerns that the innovation will be waste of economic resources. Functional risk concerns on performance uncertainty.

Since the bidet toilet seat is located inside the bathroom, the invisibility risk is used as the barrier variable. Rogers describes observability refers to advantages of the innovation being apparent to possible adopters [17]. Observability is the ease with which a product's benefits or attributes can be observed, imagined, or described to others [10]. Information access barrier related with the barrier to access Information about innovation product by the potential adopter. McCreadie and Rice, 2009 describes frequently assumes that access to technology, or use of some system, is equivalent to access to information. "Access to technology" can have a compounding effect: the more access one has, the easier and more effectively one can gain further access [13]. When a potential adopter perceives that an innovation is needed to solve a problem, he begins to seek information about the innovation's operation, its features and its implication to the situation [15]. Howard and Seth describes when the buyer interested to purchase a new product, he lacks of experience and actively seeks information from his commercial and social environments. Along with active search for information, the buyer may to some extent generalize from similar past experience.

Priority need barrier created because of less product experience and familiarity. The time at which an individual adopts an innovation depends upon several factors: the individual's characteristics, especially in terms of how he views the innovativeness with respect to that particular product, the individual's need for the product; and the individual's ability to pay [10]. According to Kaplan, decision maker can be influence by experience and they develop a sense of familiarity about their options even many technical facts may be missing. Familiarity is a degree of close acquaintance and suggests a level of comfort that would not arise from objective technical knowledge alone [15]. Infrastructure risk related with the unstable water and electricity supply in Indonesia. Bathroom design risk related to the wet bathroom condition in Indonesia. Climate related to the feature as a tropical country's climate conditions, which do not need specific warm water and bidet seat features.

III. Methodology

A. Participants

For this study, we used middle-class household consumers in Jakarta and collecting data using questionnaires to identify their barrier factors for adopt innovative bidet toilet seats in households. The survey was administrated for one month in June 2010 and generated 137 responses with response rate of 84% to Jakarta middle-class households. The questionnaires were given to the respondent directly through face to face and majority respondents are the non user. To assist respondent in understanding the product, colorful product pictures and product's features explanation were presented to them, prior filling out the questionnaires. This information helps the

respondent to enhance product knowledge which shows that the products are easy to use.

B. Procedures and measures

The questionnaire consists of three components which are demographic inquiries, barrier factor assessment and open questions about respondent's opinion towards the products. For the question which are based on adoption barrier factors towards adoption the products, the respondents were asked to mark the answers based on likert scale ranging from "strongly agree" (5), "strongly disagree" (1), "neither agree nor disagree" (3). The respondents also asked to answer open ended questions about their opinion toward barrier of adoption both non electronic and electronic bidet toilet seats. Various demographic data were also collected, including age, education, income level and number of family member.

To obtain the valid data, filled questionnaires were screened by removing incomplete responses and suspicious responses. After screening, 22 invalid questionnaires were deleted and 115 usable data were valid to use in data analysis. Given the examining nature of this study, descriptive statistics were completed using the Statistical Package for Social Science (SPPS) for Window Version 16.0. Bivariate correlations assessed the association between variables in barrier of adoption factors and qualitative analysis.

IV. Data Analysis and Results

Demographic data about the respondents in the final sample are shown in Table I. As shown in Table I, majority of respondents were males (53.91%) and between the ranges of age group of 30-40 and 40-50 years (85.22%). This represents the working age in Indonesia and as emerging middle class in Indonesia. Most of the respondents were highly educated with 87.83% of them having attained university diplomas, undergraduates and master degree, indicates of the ability to understand the function of advanced innovative product. In addition, majority of the respondent income (46.09%) was between Rp.5.000.000 – Rp.10.000.000 (1 Dollar = 9.514 Rupiah), indicates the range of middle class income in Indonesia.

Table II reports the mean and correlation between barrier electronic bidet toilet variables in Jakarta Households. The result shows that the mean of priority need barrier was 3.99 with 115 respondents. Positive scores were found for information access (3.99), economic risk (3.77) and existing usage pattern (3.54), while climate related features risk, bathroom design risk and physical risk were around mid scale. Mean score for tradition norm, infrastructure risk, functional risk and invisibility were in general had relatively weak barrier toward adoption electronic bidet seat toilet.

The further result shows that priority need barrier was associated positively low to moderate correlation with information access, economic risk, climate related features, existing usage pattern, physical risk and infrastructure risk. Furthermore, economic risk has positively significant low to moderate correlation with physical risk, bathroom design risk, priority need barrier, infrastructure risk, functional risk and existing usage pattern, while the same correlation result also found in information access with priority need barrier, economic risk, bathroom design risk, existing usage pattern, physical risk and climate related features. Moreover, existing usage pattern mostly has significant low to moderate correlation with tradition norm; bathroom design risk, economic risk, physical risk, information access and priority need barrier.

Table III shows the means, standard deviations and correlations of barrier factors adoption non electronic bidet toilet seat in Jakarta households. The table shows that priority need (3.61) is the only barrier factor to adopt the product in the household. The bivariate correlation between barrier variables was examined using Pearson correlation efficient. Significant low to moderate correlation was found between physical risk and functional risk (.589) emerges as the highest correlation. Similarly, significant low to moderate correlation between existing usage pattern and bathroom design risk were also discovered.

TABLE I
DEMOGRAPHIC

Demographic profile of the respondents (N=115)

Demographic variables	Frequency	Percentage
Gender		
Male	62	53.91
Female	53	46.09
Age		
Less than 20	0	0
20-30	8	6.96
30-40	69	60.00
40-50	29	25.22
More than 50	9	7.83
Education		
High School	14	12.17
Diploma	10	8.70
Undergraduate University	71	61.74
Master	20	17.39
Doctoral	0	0
Income		
Less than Rp. 5.000.000	28	24.35
Rp. 5.000.000 - 10.000.000	53	46.09
Rp. 10.000.000 - 15.000.000	18	15.65
Rp. 15.000.000 - 20.000.000	10	8.70
More than Rp. 20.000.000	6	5.22
Adopter	0	0.00
Non adopter familiar product	30	26.09
Non adopter not familiar		

TABLE II
MEANS, STANDARD DEVIATION and BIVARIATE CORRELATION of ELECTRONIC BIDET TOILET (N=115)

Correlations (n=115)

	Mean	St. Dev	1	2	3	4	5	6	7	8	9	10	11
1.Tradition Norm	2.97	1.03	1	.570**	.334**	.189*	.185*	0.003	0.101	0.166	0.076	0.163	0.108
2.Existing Usage Pattern	3.54	0.97		1	.423**	.428**	.332**	.247**	0.107	.447**	.387**	.370**	0.178
3.Physical Risk	3.09	0.97			1	.431**	.502**	.329**	.457**	.413**	.323**	.331**	.263**
4.Economic Risk	3.77	0.88				1	.345**	.407**	.269**	.464**	.435**	.461**	.240**
5.Functional Risk	2.78	1					1	.234*	.442**	.432**	.286**	0.157	.288**
6.Infrastructure Risk	2.96	1.02						1	0.154	.375**	.391**	.277**	0.094
7.Invisibility	2.72	1.01							1	0.136	.248**	0.098	.308**
8.Bathroom Design risk	3.11	1.04								1	.405**	.390**	.256**
9.Information Access	3.69	0.92									1	.493**	.325**
10.Priority Need barrier	3.99	1										1	.434**
11.Climate Relate feature	3.31	1.04											1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

TABLE III
MEANS, STANDARD DEVIATION and BIVARIATE CORRELATION of NON ELECTRONIC BIDET TOILET (N=104)

Correlation (n=115)

	Mean	St. Dev	1	2	3	4	5	6	7	8	9	10	11
1.Tradition Norm	2.93	1.06	1	.478**	.456**	.320**	.557**	0.115	.311**	.270**	0.143	.204*	.206*
2.Existing Usage Pattern	3.23	0.95		1	.496**	.433**	.414**	.439**	.197*	.584**	.282**	.444**	.192*
3.Physical Risk	2.56	0.79			1	.399**	.589**	.297**	.219*	.310**	.337**	.296**	.300**
4.Economic Risk	3.07	0.81				1	.420**	.258**	0.12	.400**	.416**	.430**	0.054
5.Functional Risk	2.3	0.89					1	.336**	.375**	.226*	.306**	.267**	.274**
6.Infrastructure Risk	2.88	1.16						1	.354**	.371**	.313**	.314**	.467**
7.Invisibility	2.5	0.87							1	.193*	0.165	-0.008	.548**
8.Bathroom Design risk	3.2	1.09								1	.186*	.584**	0.148
9.Information Access	2.84	1.16									1	.362**	0.161
10.Priority Need barrier	3.61	1.2										1	0.059
11.Climate Relate feature	2.6	0.92											1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

A. Qualitative Analysis Electronic Bidet Toilet Seats

The respondents were asked to give the opinion about why the products are not diffused yet in Indonesia household. There were some issues related to the answers, which are related to priority need, economic risk, information access barriers, existing usage pattern, physical risk and functional risk.

Issue relating to Priority need

Related with priority need, two participants felt that they have other main priority to buy. The lack of product knowledge seems to make many of the respondents feel that they do not need the product.

> "I feel do not need the product. There are other main priorities."

Issues relating to Economic Risk

Five respondents also believe that both the products and maintenance cost will be expensive for middle-class economic class, and suggest installing the products in hotels and shopping malls. Most of them believe that high-tech products will be expensive and easily to broke which could enhance maintenance cost.

> "I think the price and maintenance cost of the product is expensive. I am not interested in this product because it could increase electric consumption which is not environment friendly. It has too many features and not compatible with Indonesian people. The price relatively expensive for middle economic income and it has complex features. It should be place in shopping malls and five stars hotel to introduce the product then it will spread to the society. I think even it looks easy to use, it is an

expensive product and it is not a priority need. I think if the price is affordable, it will have many customers."

Issues relating to Information Access Barrier

There was six respondents feel that it is very uncommon to find electronic bidet toilet seats in the public toilets and there is almost no advertisement about the product. Due to this condition, the product needs to be introduced to the people by using advertising media. Lack of information and experience to try the product has made some respondents feel that it needs to be advertised in media.

"This product is rarely in Jakarta public buildings. I only saw it in TOTO show room gallery. Most of automatic toilet in Indonesia is auto flush type. I think it needs promotion in commercial advertising because there is no information about the product. I think people who use the product are still rarely because there is less information about the product. I think it needs to advertised and adjusted to lower price, but it should be used by the middle class. I think it is not spread yet because it is uncommon, but I interested to know more and use it someday."

Issues relating to Existing Usage Pattern

Four respondents also consider that there are still many people using wet bathroom type in their home, lack experiences to use electronic bidet toilet seats and there are only limited exclusive hotels already used the product. It has made the respondents do not familiar to use the product.

"I think this product do not spread to society because people do not familiar using this product, it hard to find even in the hotels and shopping malls. It needs to commercialize. I think it will be hard to use in the households with many family members. Many people still like wet bathroom type. I feel comfortable cleaning my backside with water and my left hand. I do not think that I should use this product due to the expensive price. I think there are many Indonesian people do not use to use bidet seat type especially with this advance type."

Issues related to physical risk

A respondent believe that electronic bidet toilet seats features could give negative impact to their body.

"It needs research about the negative impact of dryer feature to the human health."

Issues relating to Functional Risk

There was seventeen respondents believed that it will be unsafe to use electronic bidet toilet seats in their bathroom. It is difficult to use because of less information and people afraid that the product will be easily broken which could enhance the maintenance cost of specialize technician. A respondent believes the product will be complicated to use because of too much features especially for senior family members and children. It will takes times for them to learn the features and it might be break if not use correctly. Others fell that they could not repair by their own if the product is broken, due to this condition it will need specialized technician to repair.

"I think it is too complex and complicated, it will not suitable with senior family member and children because it needs time to understand the buttons' function. I think the risk of electricity use in the bathroom and product maintenance could be the reason why people unenthusiastic with it. It has risk in electricity shock and it will be hard to fix. I think the problems are product maintenance and safety. It will be hard to use for guests and senior family. I think this product is too advanced for majority people in Jakarta but it will be easy only for educated people, not all. I think it needs more detail information about product function for all family members. I still confuse to understand the function, because I never see it, but I am willing to know how it works."

B. Qualitative Analysis Non Electronic Bidet Toilet

Issue related to existing usage pattern

Concern with existing usage pattern issue; there were eleven respondents respond in this issue. A respondent does not like using seat toilet because of unhygienic reason after other people use it, while other respondents feel familiar to use squat type. Some respondents feel that their habitual to clean back side is by using left hand and soap with plenty of water to make sure the back side clean. Due to this behavior, they do not feel the benefit of using non electronic bidet toilet seats and think that using hand to clean back side is the best way to provide hygiene.

"I do not like seat toilet because I feel uncomfortable especially after other person already use the seat. I prefer water spray compare to non electronic bidet toilet seats. I think because of too many middle and low-class households in Jakarta. I think some middle upper-class people are also hard to change their behavior. Most of the people still not use flush toilet, due to this condition, some people will be hard to change."

"I do not feel clean if I do not clean my back side with soap and using my left hand. I prefer use seat toilet with water spray and clean my back side with plenty of water to make sure it clean. I am not sure my back side will be clean with bidet toilet seats. It will be difficult if I should adjust my seat position in order to get the right bidet spray position."

"I already used it many times but I feel uncomfortable to use without using my left hand to clean back side. What I feel until today, I could not feel the benefit of the bidet because of the behavior since a child. I think this behavior is hard to remove, the use of anti septic soap is necessary when clean the backside. In my opinion, water spray is more effective to clean the backside and reduce water usage."

Issue related to Economic risk

Related to economic risk issues, six respondents feel that the price of non electronic bidet toilet seats is still expensive compare to the conventional toilet. They feel that this product needs to be more socialized to society while other thinks that dry toilet will be hard to implement in major Indonesian society.

> "I think it is not familiar because the price is expensive and hard to find compare conventional toilet. I think the expensive price has made this product is still slightly used. I think this product is too exclusive for people; it is only for certain people who already have established social lifestyle and financial income. I think not all social income level familiar with the product. The dry toilet type is hard to apply in Indonesia society. I think this product only suitable for people who life with modern lifestyle. Even this is a new life style but still it has low responses because there will be additional cost to install the product in the bathroom."

Issue related to Functional risk

There is a respondent doubt the bidet's hygiene and doubt that non electronic bidet toilet seats will perfectly clean the backside.

> "I think the hygiene of bidet nozzle should be proven because when water cleans the back side, it cannot be controlled whether the water reenter the bidet nozzle or not. It cannot be sure that water spray from nozzle will clean back side. It would be possible if it cannot clean the back side perfectly."

Issue related to Tradition Norm

A respondent think that the behavior of using hand to clean back side is already a tradition in the society. This respondent already feels comfortable with their existing behavior and the non electronic bidet toilet seats will prevent them to use hand to clean the back side.

> "I think in Indonesia society, behavior to clean back side is not by tissues but using left hand and soap. So bidet toilet seats will make people difficult to do their behavior. That is why hand water spray type is more comfortable and suitable for Indonesian people. But bidet toilet seats will be suitable in public building such as offices, shopping mall and hotels."

V. Discussion

The result showed that priority need barrier is the main barrier to adopt both the electronic and non electronic bidet toilet seats in the Jakarta households. It all indicates that both of the product knowledge and awareness are still low for the people in Jakarta. The cultural acceptability of handling human waste varies throughout the world. While some culture easily accepted the idea of human excreta and others distinguish it, most cultures are somewhere between these two extremes [26]. In the future, it needs more suitable information about product advantage to enhance product value and focus to segmented customer.

A lack of awareness of the products and a lack of aggressive marketing of the product are the common situation of innovation product in developing countries. Local companies sometimes perceive the innovative product as a disruption in their working and therefore, added cost of disruption makes the project unattractive [14]. The potential adopters in developing countries may not be accepted because they are either inferior to the innovation products, or marketing strategies were unsuccessful [7]. Poor communication with customers could lead to purchase decision based on past experience rather than the new product [8]. The lack of knowledge makes potential consumers do not know the innovation product and they will not purchase it [23].

Considering the economic risk responses of electronic bidet toilet seats, it showed that most of the people believe that the product will be expensive because of its advance technology features. Meanwhile, even the non electronic bidet toilet seats has lower price than the electronic type, people still categorize it as the expensive product due to the lack of product awareness. Some respondent do not want to adopt the non electronic bidet seat because of additional cost of product installation. Consumers who emphasize price less than quality and function, in contrast customer who emphasize quality and function choose products from developed country firm. The level of quality and price should be depended on the market. Since the product produced and sold in developed country, the product has reasonable quality and price in the developed country [20]. The simplest mean to overcome international demand differences is a relative price decrease of one innovation design [4]. In the future, it needs a new electronic bidet toilet seats with appropriate technology and appropriate price to enter the market.

The high-tech product with high quality has made the product become expensive for developing countries. In the basic marketing literature, the pricing and advertising alternatives at the time of launch are usually characterized as a premium price strategy, supported by high promotional expenses, sometimes followed by price decreases through time with price skimming and a penetration with more moderate price strategy supported by a more modest promotional campaign [9]. The large potential market is only accessible if product prices are established relative to local purchasing power rather than by converting international market prices at market exchange rates [6]. Even customers in big emerging market are getting fast education in global standards, but they often unwilling to pay global prices [16]. The availability of credit has made it possible for enhance demand to buy this kind of innovation product in developing country [15].

Since information access barrier was also selected as one of the main barrier why electronic bidet seat toilet does not spread to the public, it indicates that there is almost no information about the product. Most of the product only installed in limited public spaces such as high class hotels and only a small number of people already tried the product. To enhance market demand, the product advertisement should

aware with product brand and understanding local value will be more effective to enter emerging market [16]. The product marketing also needs to promote and understanding of what sets the innovation apart from their conventional counterpart [23]. To create demand pushes innovation, value starts with the buyers and an adoption of an innovation will occur when the innovation benefits the consumer [10].

To meet the challenges of low consumption rate in developing country, marketers in the developed world will need to create and promote products that will encourage consumption instead of non consumption, an emphasis unlike the current focus on winning out over competitors [16]. Customer may interact with people from other countries or use mass media (TV, news papers) to obtain access to product related information [24]. However, a common refrain concerning those who target bottom of pyramid markets is that companies' best talents currently address the wants of consumers in developed markets, rather than the needs of those in developing markets [27].

A social marketing approach could be applied to promote non electronic bidet toilet seats as a new way to clean back side. Selling bidet toilet seats on its health benefits alone has been largely ineffective, although sanitation can be marketed like any other consumer good. Social marketing approach could increase the demand for sanitation by advertising it as a home improvement that provide security, convenience, privacy, lack of smell and flies, and improve social status [1]. The products must be adapted to meet the needs of the user and they also need to be marketed by appropriately to increase their popularity. Marketing message for sanitation need to be adapted to what local population sees as a driver for improving sanitary condition [12]. Understanding what drives consumers is central to a marketing approach and is fundamental to this product promotion program. Hygiene promotion is unlikely to be successful unless its messages are based upon the hopes and desires of the target population, an idea central to social marketing [19].

In functional risk issue, while respondent think that the non electronic bidet toilet seats is easy to use, they think that electronic bidet toilet seats is difficult to use because of the complex features. Most of the respondent already has experience to use non electronic bidet toilet seats; however they do not have any experience in electronic bidet toilet seats. Other respondents concerned about the safety of electric toilet in their bathroom. Based on this condition, customers are required to learn about a new product or how to use a new product within the concept of continuous learning [8].

The study also found that existing usage pattern also the main barrier that makes both products does not diffuse to the society. Most of the people do not accept both non electronic and electronic bidet toilet seats because they accustomed to use water spray in wet bathroom type and use left hand as anal washing. This habitual make them do not feel any benefit of using both non electronic and electronic bidet toilet seats. Toilet behaviors are usually learned at a very early age, assimilated into a daily routine and simply not spoken about unless begins to go particularly wrong [22]. Roger 1995, states that "previous practice" is the root of experience and is expected to be key contributor to not only knowledge but also behavioral intentions and actual. Anal cleansing is not restricted to specific religions or countries of the world. Either way, the fact remains that people carry out anal cleansing in various ways resulting in different hygienic conditions for both the individual and his or her surroundings [18].

Even most of the respondents have habitual to clean back side using water and left hand but this habitual is not the main barrier to adopt bidet toilet seats. This result indicates that the society would accept new innovation product which could change daily habitual if they already understand the product advantage that could enhance the hygiene. Even toilet talk might not seem appropriate at the dinner table, if the basic taboos are broken; people tend to be fascinated by the subject [22]. In the future it needs more customer education about dry bathroom type and learning how to use both non electronic and electronic bidet toilet seats to clean the back side to the new generation.

To develop the new habits of using electronic bidet toilet seats in society is difficult and expensive. Therefore the product should be located with segmented people who easily understand and become accustomed with technology will be easier. There are existing potential customers who already familiar with dry type toilet and they could be the potential market segment. It is easier to sell more of an existing product to current customers than to develop new products and brands to appeal to non customer [6]. The company should customized existing products that appeal to local condition and requirement.

Concern with other barriers that related with electronic bidet toilet seats such as infrastructure barrier in unstable electricity supply and wet bathroom design, most respondent seem did not seen these variables as barriers. This indicates that this variable will be less important if people already understand the product benefit and want to adopt it. Warm water features also not as barrier factor of adopted the product show that most of the respondent do not have problem to use warm water to clean their back side. Since the country located in the tropical area, the company could use water heater and warm seat features as optional.

VI. CONCLUSION

The study examined variables that significant barriers of adoption both electronic and non electronic bidet toilet seats in Indonesia urban households. The study identified the important keys variables that could become barriers of adoption innovative bidet toilet seats in Indonesian urban households. The use of both electronic and non electronic bidet toilet seats in Indonesian urban households is still at beginning stage of product life cycle. The study found that people do not want to adopt the product in the households because it will be enhance additional cost even they agree that the product will suitable in public spaces such as hotels, shopping malls and offices. The lack specific information about the product's benefits makes the value of the product become low.

In the future both bidet toilet seats products need more information about product advantage to enhance product value and focus to segmented customer. It also needs a new electronic bidet seat toilet with appropriate technology and appropriate price to enter the market. It needs more advertisement to segmented customer and be installed in public spaces to make potential adopter easy to trial the product. To enhance the market, it also needs electronic bidet toilet seats with simple features and easier to use for many people. In the future it needs education about dry bathroom and learning how to use both non electronic and electronic bidet toilet seats. The company could use water heater and warm seat features as optional features and customized existing electronic bidet seat that appeal to local condition and requirement.

REFERENCES

[1] "Access to sanitation in developing countries". *Postnote*, 190, 2002

[2] Avvannavar. S.M, Mani. M, "A conceptual model of people's approach to sanitation," *Science of the total environment*, 390, 1-12, 2008.

[3] Bakker. K, " Trickle Down? Private sector participation and pro poor water supply debate in Jakarta, Indonesia", Geoforum, 38, 855-868, 2007.

[4] Beise. M, "Lead markets: country-specific driver of the global diffusion of innovations", *Research Policy*, 33, 997-1018, 2004.

[5] Bouwman.H, Carlsson. C, Castilo F.J.M, Walden.P,"Barrier and drivers in the adoption of current and future mobile services in Findland," *Telematic and Informatics*,24, 145-160, 2007.

[6] Dawar.N, Chattopadhyay.A , "Rethinking Marketing Programs for Emerging Markets", *William Davidson Institute Working Paper*, 320, 2000.

[7] Dobre. C, Dragomir. A, Preda. G, "Consumer Innovativeness: A Marketing Approach," *Management & Marketing*, 4, 2, 19-34, 2009.

[8] Eng T.Y, Quaia. G, "Strategies for improving new product adoption in uncertain environments: A selective review of the literature", *Industrial Marketing Management*, 38, 275 – 282, 2009.

[9] Gupta M.C, Benedetto C. A. D, "Optimal pricing and advertising strategy for introducing a new business product with threat of competitive entry". *Industrial Marketing Management*, 36, 540-548, 2007.

[10] Herbig, P. & Dunphy, S. "Acceptance of Innovation: The Customer is the Key," *The Journal of High Technology Management Research*, 6, (2), pages 193-209, 1995.

[11] Kleijnen. M, Lee. N, Wetzels. M, "An exploration of consumer resistance to innovation and its antecedents," *Journal of Economics Psychology*, 30, pp 344-357, 2009.

[12] Luthi .C, McConville. J, Nostrom.A, Panesar.A, Ingle.R, Saywell, Schutze.T, "Rethinking Sustainable sanitation for the urban environment," *The 4th International Conference of the International Forum on Urbanism (IFoU)*, 2009.

[13] McCreadie, M. & Rice, R.E, "Trends in analyzing access to information", *Information Processing & Management*, 35, 1, 1999.

[14] Painuly. J.P, Park H, Lee M.-K, Noh. J, "Promoting energy efficiency financing and ESCO's in developing countries: mechanisms and barriers," *Journal of Cleaner Production*, 11, 659-665, 2003.

[15] Peter. R and Ramaseshan. B, Nayar.C.V, "Conceptual model for marketing solar based technology to developing countries," *Renewable Energy*, 25, 511-524, 2002.

[16] Prahalad. C.K, Lieberthal. K , "The End of Corporate Imperialism". *Best of HBR*, 109-117, 1999.

[17] Rogers E.M, 2003. *Diffusion of Innovations*. Fifth Edition. Free Press. New York.

[18] Rosemarin. A, Kvarnstrom. E, Subbaraman. M, Ganapathy.V, Dagerskog. L, Pasupathiraj. K, "Ecosan systems that accommodate anal washing", *Sustanable Water Management*, 2, 2007.

[19] Scott.B, Curtis.V, Rabie.T, Aiddo.N.G, "Health in our hands, but not in our heads: understanding hygiene motivation in Ghana," *Health Policy and Planning*, 22, 225-233, 2007.

[20] Shintaku. J, Amano. T, "Emerging market strategy of Japanese firms: Reshaping the strategies in the growing market," *MMRC Discussion Paper Series*, 278, 2009.

[21] Shiraishi. T, "The rise of new urban middle classes in South East Asia: What is its national and regional significance?, *REITI Discussion Paper Series*, 04-E-011.

[22] Sawyer. R, "Sanitation as if it really matters: taking toilet out of the (water) closet and into the loop," *Sarar Transformación SC, México*, 2003.

[23] Thiele. S.R, Paladino. A, Apostol Jr. S.A.G, "Lessons learned from renewable electricity marketing attempts: A case study," *Business Horizons*, 51, 181-190, 2008.

[24] Talkdar D, Sudhir. K, Ainslie.A. "Investigating new product diffusion across products and countries," *Marketing Science*, Vol. 21, No 21, pp 97-114, 2002.

[25] Uzoka M.E, Ndzinge. T, "Empirical analysis of biometric technology adoption in Botswana". *The Journal of Systems and Software*, 82, 1550-1564, 2009.

[26] Warner, W. S. (n.d.), "Cultural Influences that Affect the Acceptance of Compost Toilets: Psychology, Religion and Gender". *Center for Soil and Environmental Research*, 2002.

[27] Yujuico. E, Gelb B.D, "Better marketing to developing countries: Why and how", *Business Horizons*, 53, 501 – 509, 2010.

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