

## Smart Community in Public Toilet Management in Demaan Slum Settlement, Jepara Regency

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**Abstract.** One program in sanitation improvement is the construction of public toilets in coastal slums located in Demaan, Jepara Regency. The public toilets construction is a substitute for the helicopter latrines above the sea. However, most of public toilets still cannot be beneficial to the community, because there are many obstacles in its management. The purpose of this study is to examine the form of public toilet management in coastal slums with smart community approach in Demaan. The research approach uses qualitative methods. Data collection techniques are done by observation and in-depth interviews. Sampling technique using snowball method. The informants are the community who is user of public toilets, public toilet management institutions and government agencies related to the construction of public toilets. Data analysis using qualitative descriptive method and Engagement-Participation-Empowerment method. Based on the analysis result, community empowerment include establishing public toilet management institutions along with regulations and financial management, as well as developing economic values and the benefits of public toilets by adding other potential functions/activities accompanied by the use of information technology in the form of the internet. Smart communities for the development and management of public toilets can be achieved if smart people have succeeded according to their ability, openness, thinking, flexibility and creativity in utilizing proper toilets.

**Keywords:** toilet, sanitation, smart community, slum upgrading, community empowerment

### 1. Introduction

The city is the focal point for economic growth, innovation, a place where most modern productive activities are concentrated in developing countries, a place where most paid employment opportunities are and is central to modern life [1]. There are many factors both driving and pulling factors that make people decide to immigrate to urban areas, such as the availability of high-quality jobs, encouragement from family and friends, the perception that rural areas do not offer the desired economic and social lifestyle and lack of access to supporting facilities such as shops, educational facilities, services [2]. The occurrence of rural-urban migration contributes to urban growth [3] and is the most important factor contributing to urbanization [1,4]. Over the past two centuries, the proportion of the world population living in cities and towns has increased from around 5% to more than 50% [5]. High levels of population growth and significant rural-urban migration contribute to the rapid and unplanned expansion of low-income settlements on the outskirts of large cities, which occur without the expansion of public services and facilities simultaneously [1]. Slum and squatter settlements are formed due to the inability of city



governments to plan and provide affordable housing for low-income communities from the urban population [6].

Slums are a problem faced by most major cities in Indonesia and even large cities in other developing countries [7]. There are 5 slum typologies in Indonesia based on Minister of Public Works and Public Housing Regulation of the Republic of Indonesia No.14/PRT/M/2018 namely slum settlements on water, slums on the banks of water, slums in the lowlands, slums in hills and slums in disaster-prone areas. Talking about slums is closely related to sanitation aspects, as stated by UN-HABITAT [8], that lack of access to sanitation facilities is one of the characteristics in the definition of slums. One of the slums on the banks of water in Indonesia is a coastal slum area which also has a major problem in the form of improper sanitation conditions, namely the slum area of Demaan Village, Jepara Regency.

Many rejuvenation programs have been carried out by the local government in the slums of Demaan include the provision of proper sanitation facilities starting from 2012 to 2017 in the form of public toilets. Public toilets are a substitute for open latrines located above the sea or commonly called helicopter latrines. With the provision of sanitation facilities in the form of public toilets, the community has undergone changes from several aspects ranging from behavioral changes from open defecate to closed defecate and also changes in the management and maintenance of sanitation facilities. Now Demaan's slum area has 5 public toilets and there are no helicopter latrines. Although sanitation facilities have experienced improved quality but conditions in the field, public toilets in the research area have not been fully beneficial to the community because there are still many obstacles in the management and utilization. Constraints that occur include maintenance costs, lack of clean water, lack of users and community behavior in its utilization.

On the other hand, research on sanitation and slum areas that have been discovered by previous researchers is about a review of sanitation issues in terms of politics, the impact of slum and sanitation on health, alternative sanitation technologies for slums, the model of people's approach to sanitation and empowerment steps to provide and maintain public toilets [5], [9–12]. Chaplin [10] found that urban poor groups will begin to consider access to sanitation and political participation after they can meet their daily needs for food and shelter. While the sanitation aspect has an urgency to be dealt with immediately because as expressed by Ezeh [5] that poor sanitation in slum areas can increase the risk of spreading diseases such as diarrhea, typhoid, hookworm and cholera. In an effort to improve the quality of sanitation in slums, Katukiza et al. [11] provides alternative options for sustainable sanitation technology for slum settlements, one of which is the collection and maintenance of fecal sludge with options in the form of pit latrines, toilet biogas, dual flush compost toilets, community-based sanitation facilities, and peepoo bags. In addition, McCreary, et al [12] provides several options in planning the operational and financial sustainability of public toilets, one of which is the toilet design suggestion from Clara Greed [13] cited in [12] that is toilet design that can bring support partner for example co-locating public toilets with other public buildings such as firefighting stations or police stations and through sponsorship and advertising as is done on Automatic Public Toilets (APTs) built and managed by multinational advertising firms and utilizing them as advertising media [14] cited in [12]. Regarding community sanitation, Avvannavar and Mani [9] state that there are four subsystems in the system structure/model of community sanitation approaches, namely human settlements, natural environment, religion and culture and society.

From previous studies that have been conducted, there has been no research on the management of public toilets which are a substitute for helicopter latrines using a community empowerment approach. Based on the phenomenon of practical problems in the field and the absence of prior research on the management of public toilets by the community, then the purpose of this study is to examine the form of public toilet management in coastal slums with smart community approach in Demaan.

## 2. Literature Review

Smart city is a city that has a high quality of life, pursues sustainable economic development through investments in human and social capital, both traditional and modern communication infrastructure in the form of transportation and information communication technology, and managing natural resources through participatory policies [15] cited in [16]. Smart cities is closely related to building smart communities where in the process of social change must be accompanied by a sustainable process of social modernization [17]. Trencher [18] stated about the concept of smart city 2.0 where the concept of smart city uses a decentralized approach, centered on "people" where smart technology is used to address

social problems, population needs and to encourage collaborative participation. The smart city 2.0 concept is the opposite of the techno-economic approach in the smart city 1.0 concept that focuses on the spread of smart technology for corporate and economic interests. If the previous researchers argued that the role of technology is the key to smart city, Holland [19] argues that to lead to a progressive smart city, it should start with people and human capital rather than blindly trusting IT can transform and improve cities themselves. Gil-Garcia et al [20] mention that there are 4 dimensions underlying the smart city component, namely the physical condition of the environment, society, government and technology and data. Society as one of the smart city dimensions has three components in it, namely: a) knowledge economy and pro-business environment, b) human capital and creativity and governance, engagement and collaboration. In the components of human capital and creativity have elements of creative class, social infrastructure, higher education and skilled and knowledge workforce. Whereas in the component of governance, engagement and collaboration contains elements of electronic governance, network, partnerships and collaboration as well as stakeholder, citizen and community engagement [20]. In line with Gill-Garcia et al [20], Nam & Pardo [21] also revealed that the main driver of smart cities is creativity, so that people, education, learning and knowledge have a major importance for smart cities.

Smart communities are communities that make decisions consciously to aggressively use technology as a catalyst to solve their social and business needs [22] cited in [16]. The internet is the most dominant tool or media in the new media era that can be used by anyone and for any interests such as politics, business (online business and marketing), education and socio-culture [23]. In addition, the internet also contains unlimited and actual sources of information that can be accessed quickly, including exchange of information or question and answer with an expert [24]. A successful smart community is the result of a coalition of business, education, government and individual citizens. Successful smart communities can be built from the top down or bottom up, but active involvement from each sector of society is very important [25]. Smart city communities need to feel the desire to participate and promote growth (smart) [16]. Walgito [26] stated that behaviors are formed in three ways, namely habits, understanding and use of models or role models. One approach that can be taken to increase community involvement is through community empowerment. Community empowerment is a method for strengthening communities that starts with the idea that community capacity cannot be built with social engineering, but communities can be stimulated to develop themselves [27]. In building community empowerment, Bartle [27] mentions eight important principles, namely (a). The balance of power, must desire the community to become more independent and willing to make efforts and sacrifices to be like that; (b). Experienced and/or trained agents must be available to intervene to stimulate and guide the community to organize and taking action and to become more independent; (c) Assistance offered is assistance that leads to partnerships, assistance and training that promote independence and increased capacity; (d) Recipient organizations or communities may not be controlled or forced to change, but facilitators must intervene with stimulation, information and guidance; (e). Organisms become stronger by exercising, struggling, and facing difficulties. We do not promote pain, but promote struggle and effort; (f) Direct participation, especially in decision making, by recipients, is very important to increase their capacity; (g) Most of the resources needed for community projects in the form of actions must be provided by members of the community themselves; (h) It is necessary to direct the participants from the beginning to take full control, exercising full decision making, and accept full responsibility for actions that will lead to increasing their strength

### 3. Method

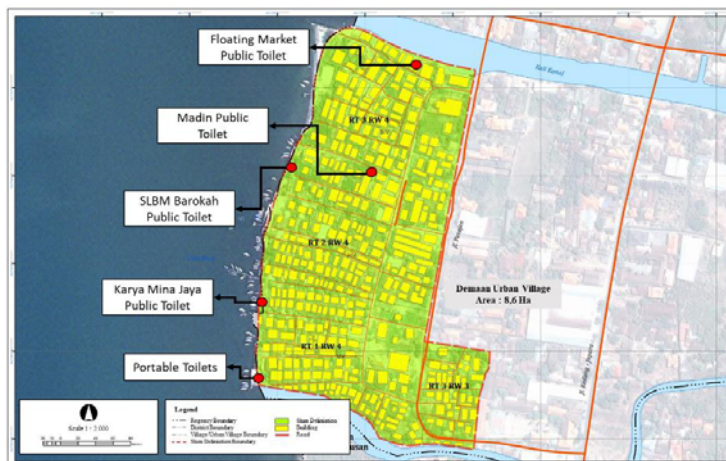
The research approach uses qualitative methods, using theory and previous research as reference to explore data in the field [28]. The data used are primary data and secondary data. Primary data is obtained through observation and in-depth interviews, while secondary data is obtained through program planning documents both from related agencies and from KOTAKU. In-depth interview using a snowball sampling technique. The informant search begins with visiting the key person, namely the Deraan Urban Village Head, then the key person directs the researcher to other informants that are suitable for the research objectives. With the snowball sampling technique, the informants obtained namely the community who is a user of public toilets, public toilet management institutions and government agencies related to the construction of public toilets. Data analysis using qualitative descriptive method and EPE (Engagement-Participation-Empowerment) method. EPE analysis is used

to analyze the community empowerment process from three empowerment processes, namely engagement, participation and empowerment with exogenous and endogenous aspects [29] to establish smart communities in the management of public toilets in Demaan Village.

#### 4. Result and Discussion

##### 4.1. General Description of Study Area

Demaan Urban Village is located in Jepara District, Jepara Regency. This Urban Village is one of the Urban Village that has the type of topography as a coastal village in the District of Jepara. Demaan Urban Village has an area of 59.914 hectares. Demaan consists of 7 RWs which consist of 22 RTs with diverse physical conditions from arranged settlements to settlements with slum conditions (Figure 1). Not all RWs in Demaan are coastal areas, only two RWs that are directly adjacent to the Java Sea namely RW 04 and RW 05. Settlements located in this coastal area have slum conditions, including residential areas RT 01-03 RW 04 and RT 03/RW 03 which is the research location which included in slum settlements in the Bupati's Decree of Jepara Regency. This slum area are the target in the implementation of a program to improve the quality of slums from the government. The following is a map of the research location:



**Figure 1.** Map of Research Location

As a general description of the study area, in RT 01-03 RW 04 and RT 03/RW 03 Demaan urban village in 2017 had a population of 1.676 people with a density of 96 people/ha and the number of family heads was 428 households [30]. The employment of most of the population in the research location is in the fisheries sector and the trade/service sector. Before receive a slum





settlement improvement program, RT 01-03 RW 04 and RT 03/RW 03 had a variety of slum problems, one of which was the lack of proper sanitation facilities. One of the programs provided by the government starting from 2011 to 2017 is the construction of 5 public toilets to replace 10 helicopter latrines scattered along the coast of the research location. But in the utilization and management of public toilets it has not been optimally carried out by the community.



##### 4.2. General Description of Public Toilet in Demaan Urban Village

The assistance program from the government to improve sanitation quality in the form of public toilets has been started since 2011. First public toilet is in RT 03 RW 04 named SLBM Barokah build in 2011. Next year, in 2012 portable toilet in RT 01 RW 04 and Floating Market public toilet in RT 03 RW 04 were built. The assistance program peaked in 2017 which was built 2 public toilets namely Karya Mina Jaya public toilet RT 01 RW 04, and Madin public toilet in RT 03 RW 04. So, the total number of public toilets as a result of government programs at the research location is 5. The overview of each public toilet in the research area can be seen in Table 1.

Table 1. General Overview of Public Toilets in Research Location

No.	Name	General Condition	Utilization	Management	Problems	Figure
1.	SLEBM Barokah Public Toilets	<p>Built in 2011 with assistance from the Public Works Agency:</p> <ul style="list-style-type: none"> <li>- Number of cubicle : 8</li> <li>- Area per cubicle : 3 m<sup>2</sup> (2m x 1,5m)</li> <li>- Toilet type :                             <ul style="list-style-type: none"> <li>➢ Squat toilet = 6 units</li> <li>➢ Sitting toilet = 2 units</li> </ul> </li> <li>- Facilities and infrastructure :                             <ul style="list-style-type: none"> <li>➢ clean water sourced from the wellbore,</li> <li>➢ electric tokens,</li> <li>➢ washing area 16 m<sup>2</sup></li> <li>➢ a toilet guard place consisting of a table and chairs</li> </ul> </li> </ul> <p>Physical condition : the interior of this SLEBM toilet is clean and well maintained but on the outside and side it can be seen that this SLEBM toilet has less accessibility</p>	<ul style="list-style-type: none"> <li>- User Origin: the average user comes from RT 02 and RT 03 RW 04</li> <li>- The number of average users per day: 16 people</li> <li>- Form of community activities: urinating, defecating and washing clothes</li> </ul>	<ul style="list-style-type: none"> <li>- Manager: Community groups with 3 members and acting as chief, treasurer and guard cleaning staff.</li> <li>- Toilet utilization fees:                             <ul style="list-style-type: none"> <li>➢ 1.000 IDR per day for take a bath,</li> <li>➢ 500 IDR per day for urinate or defecate.</li> </ul> </li> <li>- Income : 240.000/month</li> <li>- Maintenance : repairs to well pump machines, draining septic tanks, buying electricity tokens and paying wages to toilet guards</li> </ul>	<ul style="list-style-type: none"> <li>- When seawater is high and the waves are big, sea water gets into the public toilet area and can damage the water pump</li> <li>- lack of users</li> <li>- lack of road access to a public toilet that is only available in the south</li> </ul>	
2.	Portable Public Toilet	<p>Built in 2012 with PLPBK funding from the Public Works Agency amounting to 132.629.000 IDR, and then self-financing funds of 4.116.000 IDR:</p> <ul style="list-style-type: none"> <li>- Number of cubicle : 3</li> <li>- Area per cubicle : 3 m<sup>2</sup></li> <li>- Toilet type : squat toilet.</li> <li>- Facilities and infrastructure :                             <ul style="list-style-type: none"> <li>➢ clean water sourced from the wellbore,</li> <li>➢ electric tokens,</li> <li>➢ washing area</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- User Origin: the average user comes from RT 01 RW 04 and the general public</li> <li>- Number of average users per day: 6 people</li> <li>- Form of community activities: urinate/defecate,</li> </ul>	<ul style="list-style-type: none"> <li>- Manager : managed by two people to maintain the cleanliness of the toilet.</li> <li>- Toilet utilization fees :                             <ul style="list-style-type: none"> <li>➢ 1.000 IDR per day for take a bath,</li> <li>➢ 500 IDR per day for urinate or defecate.</li> </ul> </li> <li>- Maintenance : clean the toilet, improve infiltration and drain septic tanks</li> </ul>	<ul style="list-style-type: none"> <li>- the existence of RT tents can hamper cleanliness</li> <li>- lack of users,</li> <li>- lack of road access from the seafront to portable toilets</li> <li>- there is a new toilet building, the Karya Mina Jaya toilet, so that the number of users becomes divided</li> </ul>	

No.	Name	General Condition	Utilization	Management	Problems	Figure
		<ul style="list-style-type: none"> <li>&gt; a toilet guard place</li> </ul> <p>Physical condition: This portable toilet is poorly maintained where on the inside there is moss on the floor and the lower door and visible dirt and dust on the wall and portable toilet plastic door.</p>	<ul style="list-style-type: none"> <li>bathe and washing clothes</li> </ul>			
3.	Karya Mina Jaya (KMD) Public Toilet	<ul style="list-style-type: none"> <li>Built in 2017 with assistance from the Housing and Settlement Agency:</li> <li>- Number of cubicle : 6</li> <li>- Area per cubicle : 3 m<sup>2</sup> (2m x 1,5m)</li> <li>- Type of toilet : squat and sitting toilet</li> <li>- Facilities and infrastructure :                             <ul style="list-style-type: none"> <li>&gt; clean water sourced from the wellbore,</li> <li>&gt; electric tokens,</li> </ul> </li> </ul> <p>Physical condition: this toilet looks clean from the outside but the inside is quite dirty with mossy and crusty floors and the floor in the hallway is stained with rust from the septic tank lid.</p>	<ul style="list-style-type: none"> <li>- User Origin: the average user comes from Pezajen</li> <li>- The number of average users per day: 30 people</li> <li>- Form of community activity : urinating/defecating</li> </ul>	<ul style="list-style-type: none"> <li>- Manager : This toilet does not have an institution or management group and is only managed by one guard.</li> <li>- Toilet Utilization Fees :                             <ul style="list-style-type: none"> <li>&gt; 500 IDR per day for urinate/defecate.</li> </ul> </li> <li>- Income : 20,000 IDR per day</li> <li>- Maintenance : The cash collected will then be used for toilet maintenance such as buying 50,000 IDR electricity tokens and paying the wages of toilet guards of 300,000 IDR per month</li> </ul>	<ul style="list-style-type: none"> <li>- Salted well water</li> <li>- Poor sewage</li> </ul>	 
4.	Madin Public	<ul style="list-style-type: none"> <li>built in 2017 with assistance from the Housing and Settlement Agency:</li> <li>- Number of cubicle : 8</li> <li>- Area per cubicle : 3 m<sup>2</sup> (2m x 1,5m)</li> <li>- Type of toilet :                             <ul style="list-style-type: none"> <li>&gt; Squat toilet : 6 unit</li> <li>&gt; Sitting toilet : 2 unit</li> </ul> </li> <li>- Facilities and Infrastructure :</li> </ul>	<ul style="list-style-type: none"> <li>- User Origin: the average user comes from RT 03 RW 04 and fishermen including school children because they are located in one area with the</li> </ul>	<ul style="list-style-type: none"> <li>- Manager : management consisting of four people to manage and maintain toilets.</li> <li>- Toilet Utilization Fees:                             <ul style="list-style-type: none"> <li>&gt; 2000 IDR per day for washing</li> <li>&gt; 1000 IDR per day for bathing</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Aluminum doors are often damaged due to ignorance of the user when opening the door lock, especially some users are school children so the door is forcibly opened and causes damage</li> <li>- lack of clean water</li> </ul>	

No.	Name	General Condition	Utilization	Management	Problems	Figure
		<ul style="list-style-type: none"> <li>➢ Clean water sourced from dug well,</li> <li>➢ Electricity token,</li> <li>➢ Washing area 2 units</li> <li>➢ A toilet guard place</li> </ul> <p>Physical condition : The condition in this toilet cubicle is quite clean, but the washing place looks dusty and mossy</p>	<ul style="list-style-type: none"> <li>- Madrasah Diniyah (primary school)</li> <li>- The number of average users per day : 10 people</li> <li>- Form of community activities : bathing, washing clothes, urinating/defecating and washing motorbikes</li> </ul>	<ul style="list-style-type: none"> <li>➢ 500 IDR per day for urinating/defecating.</li> <li>- Income : 7.000 IDR per day</li> <li>- Maintenance : buying electricity tokens, replacing broken lights and cleaning toilets with a total expenditure of 90,000 IDR per month</li> </ul>		
5.	Floating Market Public Toilet	<p>was built in 2012 from a government program called Noto Deso (ND) with a fund of 25,000,000 IDR and then added with self-help funds of 2,256,500 IDR.</p> <ul style="list-style-type: none"> <li>- Number of cubicle : 3</li> <li>- Area per cubicle : 3,75 m<sup>2</sup> (2,5 m x 1,5 m)</li> <li>- Type of toilet : <ul style="list-style-type: none"> <li>➢ Squat toilet : 3 units</li> </ul> </li> <li>- Facilities and infrastructures : <ul style="list-style-type: none"> <li>➢ lean water sourced from wells and regional drinking water companies,</li> <li>➢ electricity token,</li> </ul> </li> </ul> <p>Physical condition : the physical condition of the toilet is poorly maintained, dirty and a lot of moss sticks to both the door and on the walls and floors of the toilet</p>	<ul style="list-style-type: none"> <li>- User Origin: the average user comes from KI 03 RW 04 and trader; and floating market visitors</li> <li>- The number of average users per day: 30 people</li> <li>- Form of community activities: bathing, washing, and urinating/defecating</li> </ul>	<ul style="list-style-type: none"> <li>- Manager : does not have an institution management group, but is only managed by a pair of husband and wife appointed by the residents.</li> <li>- Toilet utilization fees : <ul style="list-style-type: none"> <li>➢ 2000 per day for bathing</li> <li>➢ 1000 per day for urinating, defecating or washing.</li> </ul> </li> <li>- Income : 10.000-20.000 IDR per day, or 200.000 – 300.000 IDR per month</li> <li>- Maintenance : pay electricity 130,000 IDR, and the remain fund is used for KI and wages for managers including cleanliness</li> </ul>	<ul style="list-style-type: none"> <li>- Water tower is not big enough so that clean water often runs out</li> <li>- septic tanks are full fast</li> <li>- low awareness of users in paying toilet fees. Due to the limitations of the management personnel, this floating market toilet is not guarded every day, this is what is then used by users to use public toilets with fees not according to the agreement and even there are those who do not pay. This is compounded by the presence of people who pry up the contribution box and steal money in it when the toilet is not guarded. These conditions then have an impact on the decline in the amount of cash in public toilets including maintenance costs</li> </ul>	

Sources: Field Observation and Interview with Informant, 2019

Based on the results of studies in the field, it was also found that in the management and maintenance of toilets, public toilet managers were dependent on the fees paid by users when using the toilet. Whereas if public toilets suffer more serious damage and the repair fees are not sufficiently fulfilled from the toilet utilization fees, the manager/administrator is still dependent on assistance from the government. This happens because it is difficult to invite both users and community to collect money outside the fees for using the toilet.

From the general description of the toilet, it can be concluded that there are four main problems faced by public toilets in the study locations, namely (1) the absence of management institutions for several toilets such as floating market toilet and KMJ toilet, (2) minimal number of users such as Madin toilet, SLBM Barokah Toilet, and Portable toilet, so that the fund for maintenance and management is very limited, (3) the limitations and damage to facilities and infrastructure that occur in almost all public toilets, and (4) low level of community empowerment in the maintenance and management of public toilets.

#### 4.3. Analysis of Use and Management of Public Toilets

The construction of public toilets in the slum area of Demaan in five locations is an effort to improve the quality of sanitation carried out by the government to replace helicopter latrines located above the sea. With the dismantling of helicopter latrines on the sea, people must switch to using public toilets as a result of government programs. Activities commonly carried out by the community in public toilets are not only defecating or urinating, but there are other activities such as bathing, washing clothes and washing motorized vehicles (motorbikes or cars). However, after several years of using public toilets, different problems emerged for each of the public toilets in the Demaan slum area.

The problem of public toilets in the form of the lack of users, so that there is an imbalance between income and expenditure and has an impact on the maintenance and management of public toilets. In the beginning the community was difficult to accept the use of public toilets. In the transition from utilization of helicopter latrines to public toilets this requires adaptation from the community because the utilization of these two types of sanitation facilities is far different. One example is the helicopter latrine has an open structure so that people can interact with other users while defecating/urinating, while public toilets on land have closed structures and more soundproof so that people cannot interact with other users. This was also a cause of the unwillingness of the community to use helicopter latrines at first.

But over time, people's behavior began to change and gradually began to accept the use of public toilets on land. According to Walgito [26], behaviors are formed in three ways, namely habits, understanding and use of models or role models. In this case, there are two ways that shape people's behavior, habits and understanding. People who were used to using helicopter latrines were then forced to switch to using public toilets on land because helicopter latrines were dismantled by the government. The use of public toilets which begins due to forced slowly then becomes a habit that forms new behavior for the community. Then when the community has felt the benefits and is accustomed to using public toilets on land, it raises their understanding and awareness within the community of the importance and benefits of proper and healthy sanitation facilities. With this understanding, coupled with an increase in ethics, knowledge, health, and comfort for the community, they began to think of greater convenience and benefits for themselves and finally decided to build a private toilet at home. Along with the increasing ownership of private toilets, the number of public toilet users has also diminished. Changes in the way of thinking of the community in the use of toilets and followed by actions in the construction of private toilets, this shows an increase in community capacity. Community needs in utilizing healthier, more efficient and creative toilets is an action taken by humans as individuals privately by changing the way of thinking to become smart way of thinking (smart people). The process of change in the utilization and management of public toilets is as expressed by the informant, namely the Chief of RW 04, Demaan Urban Village, as follows:

*“From the helicopter latrine, the community moved to the public toilets that had been provided, a change that now the community has been able to build private toilets in their homes.” (I/F/Chief of RW 04).*



The process of behavior change and community mindset also occurs in RT 02 RW 05. RT 02 RW 05 is an area outside the research that has successfully manage the public toilets and is still active today. This is in accordance with what was revealed by the public toilet manager in RT 02 Demaan Village which can be said to be successful, namely:

*“Initially it was difficult to make people aware, little by little socialization was carried out. In the beginning even though all the helicopter latrines had been dismantled, there were still those who returned defecate in the sea, not in the helicopter latrines but on the outskirts of the sea. Eventually there was a sense of shame because of being seen by other people, so that eventually they wanted to use existing public toilets. .... At the beginning of the construction of public toilets, almost all residents were users, after time, now they have made their own toilets. .... . People are aware, that in the helicopter there are many obstacles, during the rainy season and the wave season. Adjustment of the community to be fully aware, reaches 1 year. It is not easy to change people's habits, there are many obstacles. After using public toilets, for those who experience economic improvement, start building private toilets” (I/MA/Manager of Communal Toilets in RT 02 RW 05)*

Regarding smart city, Holland [19] argues that to lead to a progressive smart city, it should start with people and the human capital side rather than blindly believing in IT can itself transform and improve the city. In accordance with the literature, it was found that changes and developments in the behavior of people from open defecation above the sea, then forced to move to public toilets to land until finally changes in habits and community mindset about healthy living habits and fulfill personal sanitation needs could be a prefix good to lead to smart city through smart people.

The lack of public toilet users because there are many people who have private toilets shows that the government's goal in promoting improved quality of sanitation with stimulation of assistance in the form of public toilets has paid off. So that from the problem of the minimum number of users and the imbalance of operational funds, a step is needed to increase the economic value and value of benefits from the public toilet. McCreary, et al. [12] provides several options in planning the operational and financial sustainability of public toilets, one of which is the toilet design suggestion from Clara Greed [13] cited in [12] that is toilet design that can bring support partner such as co-locating public toilets with other public buildings such as fire stations or police stations. In addition, there are also options through sponsorship and advertising as done on Automatic Public Toilets (APTs) that are built and managed by multinational advertising firms and use them as advertising media [14] cited in [12]. The literature shows that public toilets can be integrated with other functions to support each other and can help in their operational and financial sustainability. Therefore, one of the things that can be done to add economic value and the value of the benefits of public toilets in the slums of Demaan is to add additional functions according to the needs of the community and the character of each toilet. Figure 2 is an analysis map of handling public toilet problems in Demaan slum.

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Sources: Researchers Analysis, 2019  
**Figure 2.** Map of Public Toilet Problems Analysis in the Research Location

Public toilets that are spread in research location have different characteristics. Potential and problems in each public toilet can be developed both for the utilization and development of supporting activities. The first toilet, Portable Public Toilet, has a location adjacent to the small shipyard so that a potential additional function is activities that can support the activities of fishermen in boat repairs, such as a place that can be used for information centers about boats, ships and its aspects, as well as can be used as a gathering place or hold meetings for fishermen groups. The second toilet, the Karya Mina Jaya Public Toilet, has the potential for a large amount of vacant land in front of the toilet building. In 2010-2015, the regional government prepared a plan for the arrangement of the settlement environment of the Demaan urban village with one of its activities being to build a pavilion/gazebo in RW 04, where the location was planned to be located near the location of the KMJ Toilet. Based on the potential and plans previously initiated by the regional government, the potential additional function for KMJ toilets is the addition of green open spaces, in the form of small parks and gazebos as places where people interact with each other. The third toilet, the SLBM Barokah Public Toilet, has the potential in the form of a location adjacent to the fish fumigation place. So that a potential additional function is an activity that can support the activities of a fish smokers group, one of which is the marketing place for the smoked fish. The fourth toilet is the Floating Market Public Toilet, which has the potential to be located near the Floating Market. So that a potential additional function is activities that can support trade activities in the Floating Market, one of which is a place for marketing fresh fish caught by fishermen. The last toilet, Madin Public Toilet, which has a location located in the Madrasah Diniyah (primary school) area, has the potential to be developed with additional functions related to education such as library to increase reading interest in children in Demaan slum. Addition of additional functions to increase the economic value and benefit of each public toilet can be done by increasing the number of floors or expanding public toilet buildings.

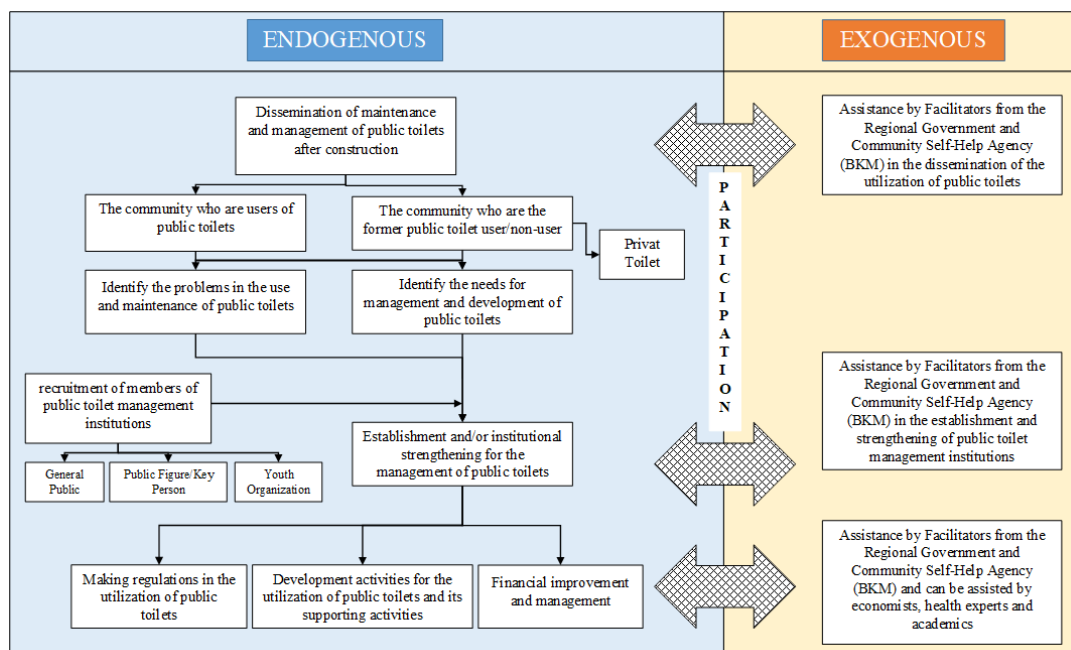
Turning from the problem of reduced number of toilet users, public toilets in the slums of Demaan still have other problems, namely the absence of management institutions, the low level of community empowerment in their maintenance and management, and the limitations and damage to facilities and infrastructure. These problems can be solved by establishing a public toilet management institution that is accompanied by improvements in facilities, infrastructure and improvements to the existing management system. To solve the four main problems in public toilets in the slums of Demaan by adding other potential functions, establishing management institutions, improving facilities and infrastructure and improving the management system, can be done through community empowerment. In addition, through community empowerment it is hoped that it can encourage community participation in becoming a smart community not only in the management of public toilets but also in the maintenance of their settlement environment. This is in accordance with the opinion of Bartle [27] that one of the approaches that can be taken to increase community involvement is through community empowerment. This empowerment approach is supported by the potential of smart people owned by the community of Demaan Slum area as capital to carry out activities that are managed together.

#### *4.4. Analysis of Empowerment Process for Public Toilets Management and Maintenance*

Community empowerment is a method for strengthening communities where people are stimulated to develop themselves [27]. Whereas Lindskog [25] revealed that smart communities can be built from top down and bottom up steps but active involvement from every sector of society is very important. So that community empowerment is chosen to be one of the efforts that can be used to improve management, increase economic value and benefit from public toilets in the Demaan slums. Steiner and Farmer [29] states that community empowerment consists of three processes, namely engagement carried out by exogenous aspect, participation carried out jointly between endogenous and exogenous and empowerment which has been fully implemented by endogenous aspects. In the case of community empowerment in the management of public toilets and its additional functions/activities to create smart communities in Demaan slums, participation from both inside (endogenous) and outside (exogenous) is needed or in accordance with Lindskog [25], which requires active involvement from every sector of society. Exogenous aspects in this case are facilitators from local government and community self-reliance institution. Whereas endogenous aspects are capabilities owned by the community internally in the Demaan slums.

Community empowerment begins with an engagement process as expressed by Steiner and Farmer [29] This engagement process is a process carried out by exogenous aspects, namely facilitators from

the local government and community self-reliance institution to invite the community, both the community as a user of public toilet and non-user, to disseminate the information about management and maintenance of the public toilets (Figure 3). After that, move to the participation process, in this process there is a transfer of power from the facilitator to the community. In this process the community is invited and given the power to identify the problems faced in the use and maintenance of public toilets and identify what they need for the management and development of public toilets. Then, with assistance from the facilitator, the community form public toilets management institution through member’s recruitment. The selection of members of the management includes the entire community, both citizens in general, community leaders and youth. The next step is empowerment, Bartle [27] stated that one of the principles of empowerment is direct participation in decision making, in this case the community is given the power to make regulations on the use of public toilets, carry out development activities and utilization of public toilets and its supporting functions/activities and improve financial management. In this empowerment process, the community is not directly left independently but still needs assistance from the facilitator. Regarding the development and utilization of toilets with its supporting functions/activities, it is possible for the community to still need assistance from the government before they can stand independently. In accordance with the principle of empowerment mentioned by Bartle [27], the assistance offered is assistance that leads to partnerships, therefore local governments can provide assistance but only as a stimulant for the development of public toilets and its supporting functions/activities, and the rest of the community must seek their own resources. This is done to create community independence and increase their capacity. The following is a chart of community empowerment processes in the management and maintenance of public toilets and its supporting functions/activities:



Sources: Researchers Analysis, 2019

Figure 3. Chart of Community Empowerment Flow in the Use and Management of Public Toilets

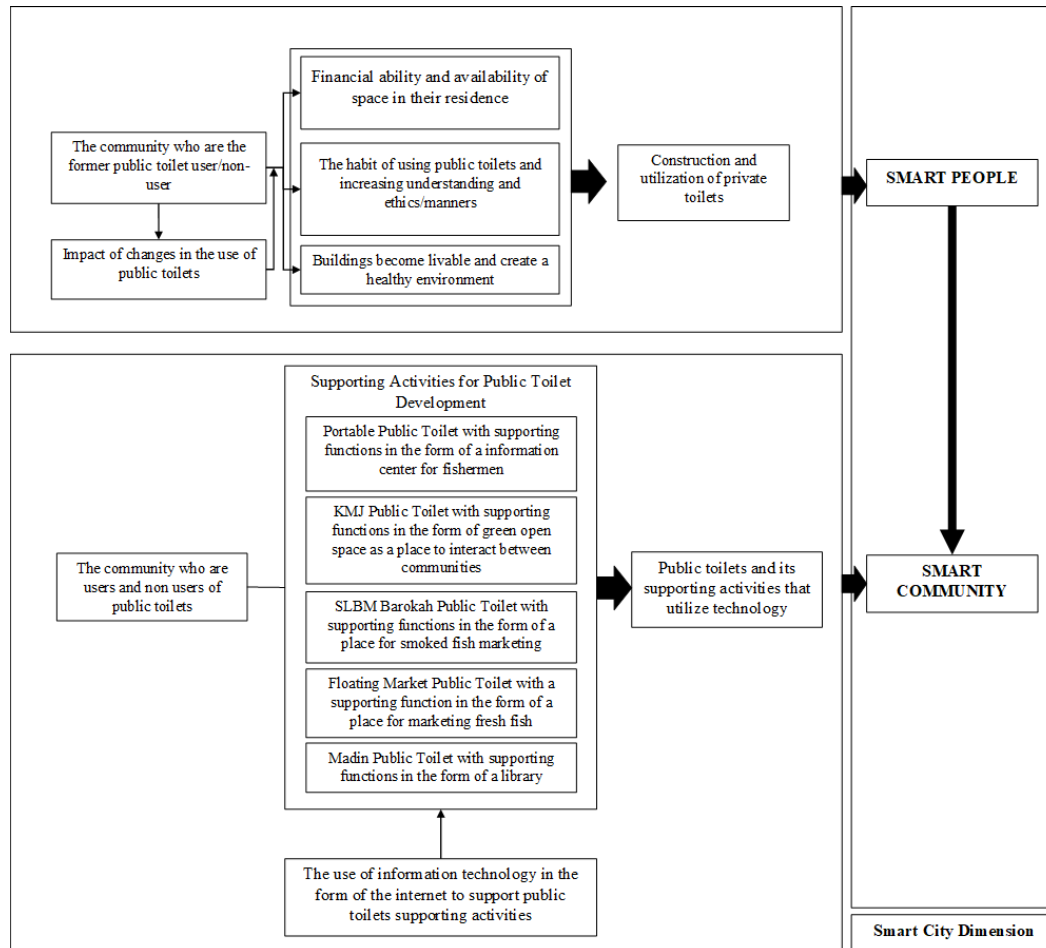
4.5. Smart People and Smart Community Form Analysis in Public Toilet Management

The process of changing behavior and mind set of the community in the use of helicopter latrines to public toilets on land, requires adjustment with a considerable amount of time and requires knowledge. So that the community can finally receive the public toilet and even increase their quality life to be more feasible and healthier. Holland [19] states that to lead to smart city starts with people and human capital. If seen from the conditions in the study area with the community change process, then the Demaan slum community is included in smart people with increased public awareness and understanding of the health

and maintenance of the environment. However smart cities is closely related to building smart communities where in the process of social change must be accompanied by a sustainable social modernization process as expressed by Cifaldi and Serban [17]. Whereas in the conditions in the research area, the community has not led to smart communities with social modernization, public toilet utilization by users, management, maintenance and supervision by managers is still done conventionally. Therefore, after the behavior change and mindset of being smarter in the sanitation aspect, the use of information and communication technology is needed to create a smart society so that it can help increase economic value and the benefits of public toilets with its supporting function/activities. Information technology that can be applied in the utilization of public toilets and its supporting functions/activities is the use of the internet that is applied in accordance with the additional functions provided for each toilet.

Trencher [18] revealed that the concept of smart city 2.0 is centered on people where smart technology is used to overcome social problems, population needs and to encourage stakeholder collaboration. Regarding information technology, the internet is the most dominant tool or media in the new media era that can be used by anyone and for any interests such as politics, business (online business and marketing), education and socio-culture [23]. In accordance with the concept of Smart City 2.0 and the benefits of the internet as the new media, information technology in the form of the internet can be used to help meet the needs of the community, one of which is to increase economic value and the value of the benefits of existing public toilets. For portable public toilet with additional functions as information centers for fishermen, the use of the internet can help fishermen to gain information about boats and ships and information to develop the fisheries sector. Likewise for the SLBM Barokah public toilet with additional potential functions in the form of marketing places for smoked fish commodities. In this case the internet can be used to help with marketing activities both to find information on smoked fish market coverage and to market smoked fish through the website. Similar to the use of the internet for marketing smoked fish, the internet can also be used in the additional function namely places for marketing fresh fish in Floating Market Public Toilet. As for the additional function in the form of library in Madin public toilet, the internet can be used to increase knowledge for the community in addition to the books provided. The use of the internet to increase economic value and the value of benefits from public toilets can be done through intermediaries in the form of computer devices. In addition, for KMJ public toilet which have the potential for additional functions in the form of green open space, the internet can be provided in the form of WiFi network so that the community can learn and obtain various kinds of information that can be accessed through laptop, computer or smartphone. As stated by Setiyani [24] that through the internet, unlimited and actual sources of information can be accessed quickly including exchange of information or question and answer with an expert. From this benefit, in this case the internet is not only useful for public toilet's supporting function/activities but can also be used to help facilitate the management of public toilets, one of which is to buy electricity token that can be done instantly via an internet-connected smartphone, besides that it can help managers to gain information about management and maintenance of public toilets. To achieve maximum utilization of the internet, then in the process of community empowerment in the recruitment of the management institution members, are not only recruiting the community in general and community leaders but also the participation of the youth. The youth tend to be familiar with the utilization of the internet in their daily activities. Socialization and assistance in IT use will be given to young generation groups such as Karang Taruna or groups that have the desire and ability to increase their capacity to use technology so that they can help other communities in learning to use the internet for toilet management and its supporting function/activities.

The use of information technology in the form of internet is intended to encourage community creativity. The internet is expected to be a portal for people to get to know the wider world and get a lot of information that is useful for developing creativity. With the increase in community creativity, it is hoped that ideas, innovations and activities can have benefits and can improve the quality of life and the environment in which they live. As expressed by Nam & Pardo [21] that the main driver of smart cities is creativity, where people, education, learning and knowledge are of primary importance to smart cities. The following is a chart of the forms of smart people towards smart communities in the management of public toilets (Figure 4) and its supporting functions/activities as a first step towards smart city:



Sources: *Researchers Analysis, 2019*

**Figure 4.** Chart of the Forms of Smart People towards Smart Communities in the Management of Public Toilets

**5. Conclusion**

The form of public toilet management in Demaan Urban Village requires smart management with smart community. Smart cities is closely related to building smart communities where in the process of social change must be accompanied by a sustainable process of social modernization [17]. Holland [19] argues that to lead to a progressive smart city, it should start with people and human capital rather than blindly trusting IT can transform and improve cities themselves. A successful smart community is the result of a coalition of business, education, government and individual citizens. Successful smart communities can be built from the top down or bottom up, but active involvement from each sector of society is very important [25]. One approach that can be taken to increase community involvement is through community empowerment. Steiner and Farmer [29] states that community empowerment consists of three processes, namely engagement carried out by exogenous aspect, participation carried out jointly between endogenous and exogenous and empowerment which has been fully implemented by endogenous aspects. In addition, Bartle [27] stated that one of the principles of empowerment is direct participation in decision making. Based on those literatures, the form of management and maintenance of public toilets in the slums of Demaan village can be done by community empowerment using the EPE method, namely by optimizing endogenous aspects (from the community, toilet

managers, chief of RT/RW) which are supported by exogenous aspects namely local government or related agencies and Community self-reliance agency. The results of community empowerment include establishing public toilet management institutions along with regulations and financial management, as well as developing economic values and the benefits of public toilets by adding other potential functions accompanied by the use of information technology in the form of the internet. To increase economic value and the value of benefits from public toilets is to add additional functions according to the character of each toilet and community needs. Additional function that can be added in public toilets in Demaan including marketing activities of smoked fish and fresh fish for fishermen, information center for the fishermen, educational activities namely by providing libraries and also green open spaces

In improving management and utilization of public toilets and its supporting functions/activities, it cannot work if the community has not yet become a smart people who understands the importance of sanitation for their health and environment. After individuals have an awareness and understanding the importance of proper and healthy sanitation, smart communities can occur through efforts namely the community empowerment and the utilization of technology. Novelty from this study is that for the utilization and management of public toilets preceded by the formation of smart people first, after that smart communities can be achieved. This is because the use of public toilets relates to the interests of each individual so that it starts from an individual awareness to increase to the willingness to sacrifice in forming a community in developing public toilets.

## 6. Acknowledgment

This article was presented at the 2nd International Conference on Smart City INNOVATION (ICSCI) 2019, jointly held by Universitas Indonesia and Universitas Diponegoro. ICSCI conferences have been supported by the United States Agency for International Development (USAID) through the Sustainable Higher Education Research Alliance (SHERA) Project for Universitas Indonesia's Scientific Modelling, Application, Research, and Training for City-centered Innovation and Technology (SMART CITY) Center for Collaborative Research, administered through Grant #AID-497-A-1600004, Sub Grant #IIE-00000078-UI-1

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