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Public Toilets Design Thinking in the Architecture Design Process

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***Abstract*— Although architectural issues show awareness of the importance of good quality public toilets, it does not take special time to discuss them in the design process. Public toilets are considered by architects as something universal, although many facts show that public toilets are always contextual. To this day, the process of designing architectural education has resulted in architects using the Design Methods approach. Along with the paradigm shift in seeing reality, the Design Methods movement shifted to Participatory Design which considers it important for users to participate in the design process. In terms of public toilets, architects still use existing universal standards and have not involved users in producing public toilets according to their respective cultural meanings. This research aims to find out whether the change in the view of the design process approach from Design Methods to Participatory Design also occurs in the design process of public toilets. The research was conducted involving the participation of architectural education final project students, cross-city professional architects, and their clients. The research method with a qualitative approach uses a constructive paradigm. The data validation and analysis use the triangulation test. The results show that the architect's design process generally still uses the Design Methods approach, even though architects do not actually conduct the design phases as theorized by Design Methods.**

***Keywords*— Public toilets; design methods; participatory design; architecture.**

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I. INTRODUCTION

Issues of poor toilet quality are always associated with low levels of education and poverty. Research at one of the major universities in Indonesia refutes this issue. In rich institutions whose citizens are highly educated, toilets are also still in poor condition [1]. In the composition of the architectural space, the toilet is not the main activity room but a service room. However, toilets have extraordinarily complex requirements to function optimally as a facility for the cleaning system for building users.

Architects solve toilet problems to produce toilets that are perceived as good. Public toilets, which were originally designed to be only a means to dispose of human body waste, have changed over time to adapt to the paradigm shifts that occur in society. Users with various awareness demand comfortable segregation between men and women [2], facilities for breastfeeding mothers [3], the needs of users with disabilities [4], to the need for an image of a place [5]. For a developing country like Indonesia, it is not easy to find a public toilet that meets the rational requirements but is also under local cultural meanings.

Although toilets are the product of the culture of the people themselves, public toilets are architectural products that are factually created through standards based on the design that is for Western society. Architects design public toilets following standard books such as Architectural Graphic Standards [6], Time-saver Standards for Building Types [7], or Architect Data [8]. Architects as experts use rationalist methods that solve problems with a generalist approach.

The Design Methods movement is a problem-solving approach that developed in the mid-20th century in response to industrialization and mass production. The movement pioneered by Jones [9] and Alexander [10] influenced the educational system and design practice. Since the 1960s, architecture students introduced this movement to solve problems formulated in project proposals. The architect's job is to be the one who best knows how to solve the problems their partners need [9]–[12]. This method was followed by famous architects [13]–[17].

Students solve architectural problems using project-based learning or case study methods in design classes. The same thing they do when working as an architect. Design methods using a rationalist and generalist approach aim to support

industry and mass products in the era of modern architecture [18]. Architects carry out their role as the party who knows best to solve the problems required by their clients. The approach's focus is to design according to the physical environment's conditions and develop technology without involving users' participation and the local community's cultural meanings.

The design methods movement received a reaction from Rittel and Webber [19], who considered that experts apply their knowledge to engineer solutions for society. This model can work effectively because the common consensus in a homogeneous society can be defined, understood, and agreed upon. When society comprises diverse groups, there can be no consensus on normativity. Each group has a different concept of value. In the 1960s the issue of pluralism and social unrest occurred in America. The issues drive the need for argumentation methods in the design process [19], [20].

Alexander and Jones left the rationalist paradigm when a new paradigm introduced by Thomas Kuhn in the 1970s was about how to see reality affects the world [21]. The architects then turned to the Cooperative Design (Co-Design) process method, better known as Participatory Design, were architects' partner with stakeholders and design according to local cultural meanings. They began to position the local community as the party that knew best what they needed. Users are considered to be the ones who have the most knowledge of what they practice and need, and the designer is the technical consultant who accompanies them. Therefore, their involvement is needed to produce a quality design [22]–[24].

In reality, professional architects still tend to use Design Methods theory books that have been abandoned by the architects who wrote them. Participatory design tends not to be carried out by architects in building planning projects but only in projects related to public policies such as urban planning, landscapes, or open spaces [25], [26]. Similar to the development of computer technology that encouraged the Participatory Design movement in Scandinavia [27], the progress of sanitary applications is also quite rapid, especially related to the environment, cleanliness, or user independence. Therefore, the design of toilets should also involve users so that they do not stutter in technology in the face of changing toilet culture [28]–[30].

In the practice of building design, there has not been a strong enough track record that produces design guidelines based on a contextual culture of partnership where an architectural product is located. In 1919, when the Bauhaus art school was inaugurated, its lecturers had already conducted collaborative programs to create architectural products oriented toward modern industry. Buildings and other artifacts must be designed to produce progressive social and cultural change. At the Bauhaus workshop, they combine distinctive design competencies. Arts, crafts, architecture, and technology experts worked together to build the Gesamtkunstwerk, a truly collaborative design work [31].

Regarding public toilets as cultural products, the question arises, how do architects respond to the change in the view of architects as problem solvers to the view that problem-solving is carried out jointly between architects and the community that owns the culture? Do they stick with the theory of the design method movement, switch to participatory methods, or are there other methods outside of the two?

II. Materials and Method

This research was conducted using a qualitative approach based on a constructive paradigm that rewards communities for the right to interpret their respective cultures. To understand well the social world, interpretation, meaning, interaction, and quality in the process of action carried out by architects every day. Researchers must understand the dynamics of the architect's profession from the architect's point of view [32], [33]. Perspectives as insiders and outsiders are ethnographic research methods built and constructed using emic and etic analogies [34].

Data collection begins by observing the phenomena related to architects' actions when designing public toilets as part of their respective architectural projects to produce a research framework. After getting a rough idea from the architect community, the data sources were mapped based on groups of practitioner architects, students participating in the architectural design final project, clients, residents/users, and lecturers. See Table I. All informants' names have been camouflaged. Research schedule April 1, 2020 – June 30, 2021, in Gowa, South Sulawesi, Indonesia. The data validation and analysis use the triangulation test. The results were presented using the narrative method.

TABLE I
Research Informants

No.	Informants	Number
1	Practional Architects	18 people
2	Architectural Final Project Students	23 people
3	Client	14 people
4	Residents/Users	31 people
5	Lecturers	12 people
	Total Informants	98 people

Due to pandemic reasons, data collection of inter-city practitioner architect informants in Indonesia was carried out using the FGD method and in-depth interviews through teleconference and telephone media. Observations of the activities, FGDs, and interviews of students and lecturers were carried out in their final studios or the rooms of the Department of Architecture related to their activities. Data were collected, mapped, and analyzed using the cultural domain [35].

III. Result and Discussion

A. Design Thinking

Designing is the creation of an idea. However, choosing the process required to create an idea is often confusing because it is difficult to determine which process can perform better than the other [36]. Design Methods simplify the complexity of the steps carried out in systematic design into three-phase steps: the analytical, creative, and executive phases of communication [22]. However, whether architects carry out these stages to create their creative works still invites a question mark [37].

Although the design classes focus on the theories of Design Methods with the aim of design as a problem solution, students participating in the final project tend to develop their

methods without being disturbed by the theories that have been studied. When students enter the studio, they already have a written draft concept. Based on this concept, students draw their projects. This is different from what architects generally do when working in their respective studios. Architects independently make designs according to their respective interpretations of meaning. Design concepts are made by architects only for needs when they participate in design auctions.

FI, a lecturer and senior architect, shared his experience when he got the legislative building project. FI is required to present the draft before the commission and plenary meetings. Discussions with legislature members were heated because each legislature member had a different view of the draft that was considered representative of the legislative building. FI made a draft concept proposal when participating in the tender, but the concept was ignored during the detailed engineering design (DED) process. Project managers and legislature members only focus on the appearance of buildings and things that are visual in nature. In the consultation, public toilets were not discussed at all. FI was only asked to provide private toilets for legislative leaders. He designed public toilets using the standards in design manuals.

In final project studio, EF who is very good at sketching, started his design with the idea of dynamic shapes based on irregular triangles. This form has then functioned as a sculpture as a place of expression for street artists. The toilet was thought of after the complete form of the building was completed. The toilet's function is included in the empty building along with other spaces. The public toilets are mostly placed in triangular corners. When the pointed corners of the triangle seemed incompatible with his toilet room idea, EF decided to cut the corners of the building's triangle (see Figure 1).

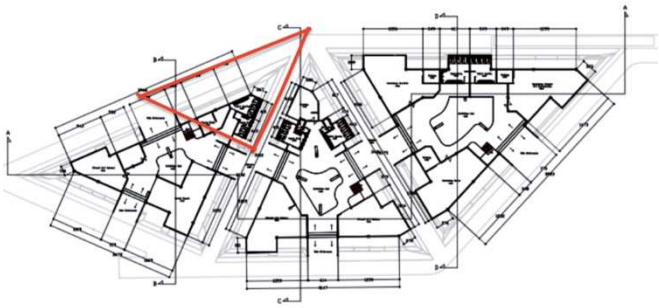

Fig. 1 RFProject with the triangular corners of the building floor plan was cut to fit the standard rectangular shape of the public toilets floor plan. Source: Department of Architecture, Hasanuddin University [38].

With the theme of the slide park project, BO focuses on dynamic forms that are rich in arches. The difference is that BO is consistent with his choice of building form. The entire design concept of the room, including the toilet, consistently follows the dynamics of the curved lines of the building. FI was reluctant for the shape of the building to be damaged because he had to follow the rectangular shapes commonly found in toilet designs (see Figure 2).

EF and BO consistently always connect the design concept with the resulting design. Synchronization of each completion of the design stage is conducted with feedback from the previous stages. FA and BO created with the concept of function following the shape of the building. Started the idea by processing the building's three-dimensional (3D) shape. During the design process, EF and BO make different decisions. EF chose to prioritize the standard rectangular shape of the toilet rooms and sacrificed the basic triangular shape of the building. On the other hand, BO always adapts the shape of his toilet rooms to the curved shape of his building.

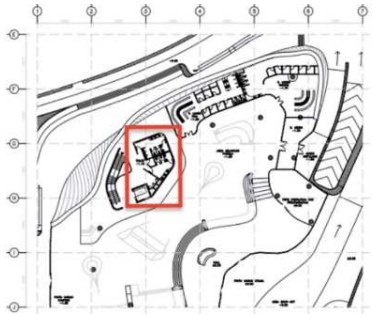

Fig. 2 BO Project adapts the shape of the toilet rooms to the curved shape of the building Source: Department of Architecture, Hasanuddin University [38].

Unlike EF and BO with design methods, where the architect himself entirely conducts the design process, YA chose the Participatory Design process as the topic of her final assignment for Student Housing Areas. Since submitting the proposal, she has involved residents of the area to be designed. They have dialogues and discuss the things that are the hopes of the architects and members of the community. YA invites residents and boarding students to formulate problems and objectives of regional design.YA and residents make the concept of service groups related to activities in the boarding area.

The joint decision resulted in homeowners being allowed to provide boarding rooms in their respective homes but supporting facilities such as daily necessities stalls, food, and drink stalls, and laundry will be placed according to the location of their homes. Houses that double as food and drink stalls are required to provide toilets that their shop customers can access. It does not matter if the toilet is shared with the owner of the house. YA and the residents made the layout of the area and the typical cottage according to the dimensions of the houses that the residents wanted. (see Figure 3).

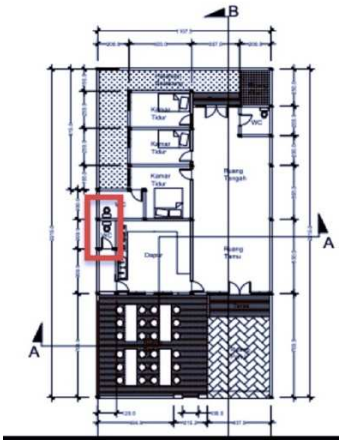

Fig. 3 The boarding house – cafe owner, provides a simple public toilet for café customers. Source: Department of Architecture, Hasanuddin University [39].

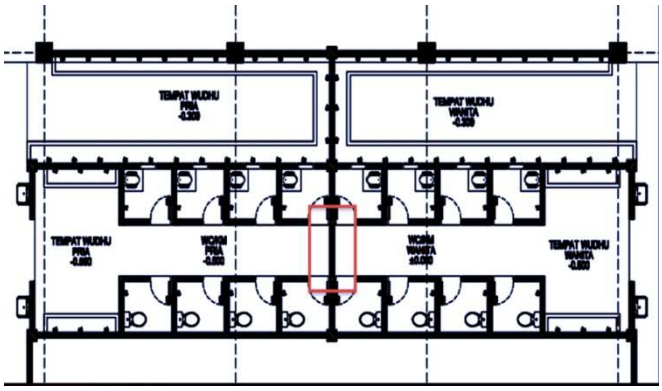

Fig. 4 Public toilets with a connecting door between the male and female toilet areas. Source: Pillar Bangunindo [40].

AR's team focuses on serving Islamic buildings such as mosques and Islamic Centers spread across various regencies in South Sulawesi. In the design process, AR always involves his clients before making decisions about the design concept of his building. AR's team is worried that they will produce designs that are not under Islamic principles. In this case, the toilet is always a consideration in the separation of facilities between men and women as in other facilities and based on the meanings of Islamic buildings.

On Friday, the mosque is only visited by men [41]. On that day the women's toilet was converted into a men's toilet. A connecting door to the women's toilet area was made to support this function, which was only opened when needed. When I asked if it was not thought there was an opportunity for crimes against women that might occur with the connecting door, AR stated they had not thought about it. They only consider that the number of male users who fill the mosque requires more toilets than on normal days. (see Figure 4). AR also explained that there was a client's desire to remove the urinal in the mosque's toilet hall and replace it with a cubicle closet. The hope is that male user can squat in the closet while urinating.

Architect DE recounted that from the beginning of designing the building, DE was always thinking about where the toilets were placed and how they would affect other spaces. DE did not want the toilet's existence to cause problems when the project was built and maintained. In the government office design, DE has already completed the concept of spatial relations before making the design drawings. The idea starts with making activity functions the focus of the design. He placed a toilet location that met all the conditions he hoped would produce a superior quality toilet.

DE's idea above turned out to be impossible when he oversaw designing the renovation of the regent's office; he revealed to his client that the entire toilet area had to be dismantled and rebuilt because the capacity and quality were no longer in line with the current needs. But he is tied to the location and dimensions of the toilet room that must be maintained. DE proposes to enlarge the dimensions at the expense of the existing workspace. The user accepts the concept offered by DE because DE thinks he has been entrusted to conduct the task of designing the facility.

In the restaurant project, FA's client wants the restaurant's public toilet to be as good as the one FA usually uses when visiting public facilities abroad. FA wanted to show that the appearance of the restaurant's public toilets represented the class of his restaurant. The number and quality of toilets in the restaurant are adequate so that visitors do not have to queue when they want to go to the toilet. When the restaurant's capacity was increased from 700 to 1,000 diners, FA increased the toilet area from one area to three areas. The goal is to make toilets accessible from a distance that is not too far away. This change in the number of toilets directly increases the project budget. FA client accepted the budget changes and was consistent with the principle that the availability of adequate public toilets is a prerequisite for an excellent restaurant.

EF and BO use design methods when designing their project were entirely carried out with a positivistic approach. The paradigm developed by August Comte builds social science based on natural laws. Here meanings are neglected, and human behavior is measured like matter [42], [43]. The meaning of the design was constructed by the architect using universal standards. There is no opportunity for dialogue in a normative process, whether the user's ideas are in line with the architect's ideas [44]. AR, DE, and FH put the interests and expectations of the client as the main thing in designing. The dialogue and construct together with the meanings are generated in the design. However, DE's client did not play an active role in the design process. In contrast to AR and FA, who collaborate with their clients as active users. Their involvement is necessary, because they have the most interest in the design results.

The process conducted by the architects above is very different from what YA did. The architects project relates to public policies. Therefore, YA involved stakeholders in this community and local leaders of their communities. YA places the boarding community as the owner of meaning. YA as architects, assist them in constructing their own new meanings so that the resulting designs are compatible with their daily lives [45]. Citizens are involved since problems are explored and formulated, and ideas are developed until solutions are generated.

YA realizes that participation is at the core of Participatory Design, where residents are not only informants, but also participants in the design process. Participation demands recognition of user interests as a completely legitimate element of the design process. Here the architect and the user learn from each other. The architect uses her knowledge of expertise and users with knowledge of how to use them [46], [47]. In many cases, architects need to develop and modify their methods in response to local contexts [48].

B. Availability of Development Fund

Architectural projects are always associated with the availability of a large budget. Form follows finance occurs in architectural projects. Buildings are no longer seen for mere function but become a commodity of the financial system. It is possible that a building is not made for a social function but for the circulation of money [49].

The toilet room has the highest price 2-3 times the unit price per m2 compared to other rooms. During the FGD with practicing architects, all agreed that the public toilets in Indonesia must include for ablution facility. Usually, by reason of needing clean and dirty water networks [50], the facility is placed in the zoning of the toilet room. The addition of this facility will obviously increase the price of the building.

For efficiency reasons, the architects worked around this by reducing the number of toilets or placing ablution faucets in the toilet hall, the space where the sink and/or urinal are usually located.

RI, a lecturer, does not accept that the ablution room (wudhu room) is placed in the toilet zone for efficiency. For RI, the toilet is a place to clean the body from dirt, while the ablution room is a place to clean the body from najis. Ablution is a process of cleansing the body of Muslims. Therefore, toileting and ablution activities are placed in adjacent zoning. Wright [51] distinguishes between what is considered clean and holy in terms of permissible and prohibited impurities. Impurities that are allowed to occur naturally, while prohibited dirt is considered as *najis* which makes one's worship invalid.

DE works in districts far from big cities and generally works on government project designs. DE has been involved in the project since the budget was proposed. In practice, DE always adapts his plans to changes in the budget that occur. When the proposed building design is made, DE designs according to the client's expectations, including their desire to make the appearance of the toilet as an imaging tool. The aesthetic quality of the toilet is expected to be equivalent to that of a five-star hotel. In its development, the proposed budget was not fully approved. DE had to revise the initial draft proposals made to match the available funds. One of the ways chosen is to reduce the aesthetic quality of the toilet. Finally, the design of the toilet is present like other simple toilets which are intended to fulfill the function of managing waste and no longer for imaging reasons through aesthetic quality.

Although FA's client did not set a budget limit for toilets, FA reminded that the toilet material chosen was aesthetic considerations and safety concerns. If the proposed material endangers the user's safety, FA will explain it to his client. For example, a high-priced cubicle door proposed by his client was rejected because FA considered it unsuitable for the needs of public toilets. FA explained that the cubicle door must float above the floor so that if there is a problem with the user, the manager can help the user quickly.

FA also reduced the number of male closet cubicles in standard books and replaced them with urinals. The reason is that only a few men go to public toilets to defecate but to urinate. Women's number of closet cubicles is maintained because women need more time in the toilet. There seems to be an increase in awareness of the need for a number of women's toilets. Some researchers have complained about the lack of closet cubicles for women in big cities in developing countries such as India, Indonesia, and America. The lack of toilet facilities for female users has forced them to hold their urine regularly. This condition has the potential to become a disease [52]–[54]

Architectural products are present as human needs in the layers of Maslow's pyramid according to the situation and conditions of the people [55], [56]. When planned, DE's client wanted to present his toilet as self-actualization, human need at the top layer of Maslow's Theory pyramid. Sizeable project funds will be devoted to the appearance of public toilets compared to other spaces. However, when the budget allocation changes not as much as expected, the need for self-actualization is sacrificed. The position of the public toilet down to the bottom of the pyramid becomes a basic need for the function of cleaning the body and managing waste. This is in contrast to FA's client, who was consistent from the beginning of the design to the implementation of the project.

Toilets are not considered something of cultural value, as described by Kluckhohn [57]. Nor does the assumption [58] that utility makes something use-value. That a product's use-value is not related to the product's price but its utility. However, according to Hegel, the utility does not exist in a vacuum. The utility has a marginal exchange rate. Here public toilets appear not only for use-value but also with a marginal value determined subjectively by the buyer [59]. From the very beginning, architects worked not only to produce useful works but also to expect their work to have a subjective aesthetic [60]. For Deleuze [61], subjectivity means an irreducible quality of power that acts independently of a particular person. Architecture is not just making or designing, drawing or building, but creating, selecting, and subjective conditioning-related fields. FA and his client created the marginal price of this toilet to offer to the restaurant consumer community.

Like DEI, AR also did the same thing in getting a job as an architect of the Islamic Center building. What is different is that AR acts on behalf of the orientation of Islamic values so that public toilets are placed as important spaces in buildings and not just as service facilities. Value is related to culture as a conception of the desired concept and plays a role in influencing the choice of action [57]. Value orientation is always unique and contextual and is owned by each community [62], [63]. AR's public toilet distinguishes it from what is perceived as un-Islamic. Here, Islamic public toilets should not be placed at the bottom of Maslow's pyramid, namely self-actualization.

C. Limited Time

Designing is a creative process to generate creativity. A designer is a creative artist who is never satisfied with his designs. They always want to perfect their work. Therefore, the quality of the design is closely related to the duration of time the designer has at work. However, there are many stories that architects talk about the 'one night speed system' when they get an assignment. When digital technology develops, architects become easier and faster to work because they can use copy and paste techniques. Standard toilet templates with various capacities can simply be dragged into the resulting plans.

Cuff's research on three architectural firms and studios shows that the world of work in architects is a complex one. To interpret and finalize a design, an architect must negotiate with the client. There are many differences between the competencies and professional practice acquired during college and those determined by the architect' association. These differences are supported by the cultural context in which the architect is located [32].

Professional architects working on government projects are bound by a budget cycle that includes budget preparation, execution, oversight, and reporting and accountability[64]. Absorption time is relatively limited between 3-6 months. The working time can be considered sufficient for architects who have made proposals since the budget proposal was made but not for those participating in the tender. Architects focus on

working on the outline of the building and its functions and do not have time to linger working on the details of non-standard buildings, according to the local meaning for public toilets as desired in the participatory design.

When a pandemic outbreak appeared in Makassar in March 2020, the Work From Home (WFH) policy was implemented [65]. Consequently, all teaching and learning processes, including the final project studio, must also be conducted using the WFH system. The WFH schedule is changed periodically according to pandemic conditions. Even though the university has prepared Learning Management System (LMS) facilities, the situation with WFH's obligations and using the online learning process made lecturers and students panic.

In consulting services, lecturers use the LMS platform optimally because all document archiving systems for the learning process are stored properly. This is in line with the transition of the university administration system from a mixed offline-online system to a totally online system. Make it easier for them to report performance at the end of each semester. In an offline system, lecturers need time to enter their performance into the online management system.

Not all lecturers and students want to work using the LMS platform. Quite a number of people choose to continue to consult online by showing their designs in digital form or on drawing paper. For example, for a reason, that face-to-face consultations are better because lecturers and students can easily discuss the resolution of design problems. The downside is that consultations are limited to the WFH schedule. Initially, students and lecturers assumed that the pandemic would be quickly controlled, so they thought the consultation could be postponed for a while. When the pandemic continues, and the WFH schedule continues until 2021, the completion of student projects is also delayed and protracted.

The convenience of lecturer consulting services obtained by lecturers and students who use the LMS application cannot be separated from the concept of a constructive paradigm that benefits students and lecturers. The constructive paradigm places equal relations between two parties through transactions, negotiations, and collaborations. Through this relationship, efficiency and superior design quality are achieved. Students get an unlimited service, while lecturers get a well-recorded performance filing system, things that are difficult to dialogue in the offline learning process.

Both situations of using offline and online learning media indicate that changes in the culture of the communication system affect the work culture of architects. The online system demands student agility to use various learning media. When there is a change in learning culture, EF and BO easily adapt. On the other hand, according to the offline culture before the pandemic, Putu et al., [66] who chose working hours, had difficulty adjusting. Spencer [67] warned of a situation in his theory of Survival of the Fittest in the 1800s that still holds today.

Students work on their projects for nine months in the final project studio. The project starts making a proposal, going to the field to collect data, making concepts to designing. Design methods make it easier for them to control work and complete projects on time because all activities are carried out with a generalist approach using universal design standards. Students have plenty of time to work without the need to involve stakeholders in decision-making. If there are parties connected with the design process, then it is only the supervisor related to the quality of the design and administrative staff for scheduling the periodic report schedule.

From FGDs with professional architects and observations of student work processes in the studio, it shows that time management is specifically connected with making concepts about toilets according to the local meanings of users. All architects agree that the toilet is important, but there is no need for a special time to discuss it. For them, improving the quality of toilet design is simply done by improving the materials' quality.

YA experienced the problem of time constraints, which from the beginning, involved community participation in formulating problems, creating ideas and concepts, and putting them into a design. YA must arrange a meeting schedule with the boarding community between the final project schedules. The schedule must be adjusted and not interfere with the daily routine tasks of residents. This makes the final project schedule prolonged. The followers of Design Methods judge the increase in time as something that turns out to be not balanced with the resulting performance. For example, a simple public toilet results take a long time and large energy compared to that produced by other YA colleagues. The important point here is to listen to their voices. They have limitations to participating because of personal and sensitive reasons [68]. In this case, there are limited funds to make public toilets that suit their needs.

In terms of participation, there is a clear difference in the purpose of the chosen method between the Design Methods commonly used in architectural education, which is conducted with a traditional approach serving users who buy architect designs according to what they offer. Participatory design is carried out with a critical approach where ideas and inspiration are challenged and not adopted or taken for granted by the community [31]. The key point here is that the ethical attitude of the design objectives is not related to the quality and value of the results. In participatory design, people's representations and activities are developed by them and with them [68]. It is in contrast to design methods, where the roles of the designer and user are defined from the start in the analysis phase. In Participatory Design, the roles of designer and user are mutually negotiable and tend to shift across different spaces. The goal is that many people's talents and creative energy can be productive and useful [69].

The approach that architects choose in the process of designing their projects uses design methods. Architects are still tasked with solving problems, especially those related to government projects. They only involve the client when the design is related to budget availability; it contrasts with architects who manage non-government projects. Here architects involve their clients in the design process. Architects position themselves as companion experts, with users as informants about their expectations regarding the designed facility. This is very different from what happened to architects who used the Participatory Design approach. Architects and users work together in the design process. Architects work based on their expertise, and users work

based on usage practices they know. Architects and users negotiate a good design according to their agreement.

IV. Conclusion

In the toilet design process of toilets, it is found that it is related to budget availability but not time availability. This happens in all processes that use Design Methods or involve user participation as informants. The shape of the design is influenced by the value orientation adopted by the client. In government projects, the value orientation may change according to budget and time availability. The value of a toilet designed as a self-actualization need can turn into a basic need for benefits only when the budget and time are limited. However, for non-government projects/community organizations, the availability of the budget does not affect the value orientation. The position of public toilets remains as a need for self-actualization even though with a limited budget. In Participatory Design, time can determine the form of the agreed design because the agreement may change over time.

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