Sanitary Facilities: An Overview of Important Users' Perceptions for Public Buildings

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ABSTRACT

Sanitary facilities are essential spaces in any building type. Sanitary facilities in public buildings serve as ingress and egress for diverse users encompassing varying genders, ages, behaviours, cultures, and disabilities. Particularly Malaysians, who possess diverse backgrounds, faiths, ethnicities and beliefs. Sustainable construction and building practices have been used in recent years to lessen the impact on buildings, users and the environment. Sanitary fixtures in sanitary facilities have deteriorated, nonetheless, as a result of end users' ignorance. This study offers an overview of sanitary facilities based on users' perceptions in public buildings in Malaysia. The study necessitates a pilot and case studies utilising questionnaires for quantitative research methods and the discussions and interviews employing semi-structured questions for qualitative research methods. Both research methods involve the general public as well as experts who have used sanitary facilities and constructed public buildings. The findings from mixed research methodologies are pertinent not only to enhancing the general public's experiences in sanitary facilities but also to professional institutions, requirements and other aspects concerning sustainable sanitary facilities in Malaysian public buildings. Additionally, additional details about the development of a new design model for gender-specific toilets and shared sanitary facilities for designers, as well as requirements from the perspectives of the general public and experts. Women spend twice as much time in sanitary facilities as men do. Hence, the present designs of female toilets are not suitable for them and deserve twice the number of sanitary fixtures as there are for male toilets. Here, the overview includes relevant information about important users' perceptions of sanitary facilities in public buildings.

Keywords: Sanitary facilities, Sanitary fixtures, Suitable sanitary facilities and fixtures, Users' perceptions, Public buildings

INTRODUCTION

When the general public is out, whether indoors or outdoors, sanitary facilities are among the several spaces people frequently seek. However, designers haven't paid as much attention to sanitary facilities (Greed, 2016, 2019; Robert & Greed, 2014; Ramster et al., 2018). This stems from the general public's negative perceptions of sanitary facilities, despite elegant design and capacity that fulfil users' requirements. According to Bovens and Marcoci (2017) and van Hautegem and Rogiest (2017), queues have formed because female toilets lack sanitary fixtures that are comparable to those in male toilets. It underscores the importance of sanitary facilities in public buildings for all users, especially parents with children, elderly individuals, and other users. Obtaining the general public's perceptions of sanitary facilities in public buildings is essential for the benefit of all users (Peng and Wu, 2023; Wan Shaberi et al., 2024).

Malaysia's swift expansion has resulted in an increase in the number of public buildings. The proliferation of public buildings has resulted in heightened expenditure by the general public and tourists during hectic hours and peak days (Ganesan, 2022; Morden, 2023; Roslan, 2023). Users are required to queue for access to sanitary facilities during specified hours and days due to the design and availability of the facilities (Bovens

and Marcoci, 2017; van Hautegem and Rogiest, 2017). Queues in female toilets are prevalent due to the tendency for women to require twice the time of males. Furthermore, women encounter challenges related to cubicle dimensions, attire, menstruation, and additional factors (Greed, 2014, 2016).

Sanitary facilities are crucial in public buildings because people often enter and exit these spaces during operation hours. Sanitary facilities and fixtures should be developed and provided with consideration for the users' requests and suitability. Currently, sanitary facilities in public buildings are merely following basic criteria and being inattentive to the design element (Nazir et al., 2018; Yacob et al., 2019; Rosli & Zulhumadi, 2019; Isham et al., 2022). Plus, existing standards and design guides for sanitary facilities need to be changed and synchronised. This is due of informational inequalities that have led to barriers between authorities, designers and other experts, as demonstrated in Table 1. Plus, Malaysian by-law number 257 enables and incorporates the British Standards as a reference (International Law Book Services, 2022).

Table 1. Different Cubicle Sizes by the Standards and Design Guidance

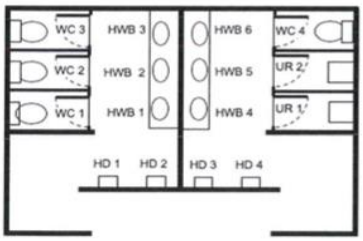
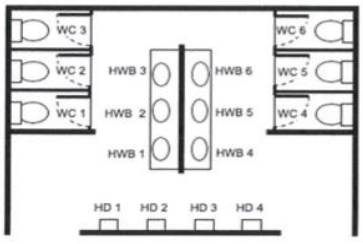
Standards/Design Guidance	Code	Cubicle Size (Length x Wide) (mm)
Malaysia Standard	MS 2015: Part 1: 2017	2200 x 1200
Uniform Building By-Law 1984	No. 43	1500 x 750 (water closet)
Uniform Building By-Law 1984	No. 43	1250 x 750 (squat toilet)
British Standard	BS 6465-1:2006	1300 x 800

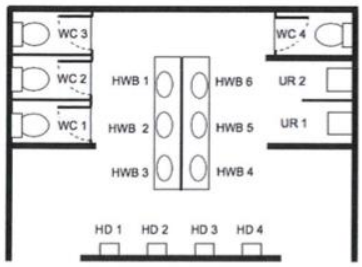
Source: Author's summary

Existing female toilet designs are frequently unsuited for female users. For instance, numerous standards and design guides highlight the needs for varying quantities of sanitary fixtures in female and male toilets (Beebeejaun, 2017) and variance in minimum size (Greed, 2014). In addition, as females are known to spend longer time in sanitary facilities, the number of sanitary fittings in female toilets is intended to be twice or triple (Goldsmith, 2000; Greed, 2016). Studies of sanitary facilities notably highlight the drawbacks of female toilets compared to male toilets (Greed, 2014, 2016, 2019; Robert & Greed, 2014; Ramster et al., 2018).

The studies conducted by Bovens and Marcoci (2017) and van Hautegem and Rogiest (2017) reveal that female users endure extended waiting periods due of the design and provision of sanitary facilities and fittings. Additionally, males have the option to use either urinals or water closets, whereas women only have access to water closets. At the same time, in cubicles, it features sanitary bins, paper roll dispensers and more extra fixtures. The conclusions of both research projects are that shared sanitary facilities ensure equitable waiting times for all users. Details of shared sanitary facilities are presented in Table 2.

Table 2. Descriptions and Figures of Shared Sanitary Facilities

Sanitary Facility	Description	Figure
Mixed-gender toilet	Mixed-gender toilet is where a female toilet and a male toilet located side-by-side and is openly accessible to users when either toilet is empty and unoccupied.	
Unisex toilet	Gender-neutral toilet is a sanitary facility with one open space for all users that contains only water closets in cubicles with fully closed doors and walls for users' security and privacy, cubicles can be either shared or segregated, and fully shared handwash basins, hand dryers and other fittings.	

Gender neutral toilet	Unisex toilet is a sanitary facility with one open access to all users with fully enclosed doors and walls of shared or segregated cubicles that contain either water closets or urinals and fully shared other fittings.	

Source: Author's summary

LITERATURE REVIEW

In this overview, seven perceptions were established regarding sanitary facilities in public buildings: 1) execution of the standards and design guidance; 2) building conditions; 3) early and continuous education; 4) hygiene; 5) water usage; 6) gender-specific toilets; and 7) shared sanitary facilities. Any building endures deterioration as part of its life span (Talha, 2015; Nazir et al., 2018; Yacob et al., 2019; Zhu et al., 2021). Studies of sanitary facilities by Nazir et al. (2018), Yacob et al. (2019), and Rosli and Zulhumadi (2019) at Malaysian mosques, schools and a university indicated that the buildings did not implement the standards and design guidance. Results showed changes in sanitary facilities required to be done in mosques to accommodate all users, 65 and one out of 300 schools are in serious and very serious conditions, and there are a short number of handicap facilities on campus.

In 2015, Talha delivers a thorough picture of the entire life cycle of a building. The government, local authorities, and professionals can execute this approach to guarantee that the users of public buildings have comfortable and secure environments. Additionally, the government and local authorities must make sure that the designers and builders follow to the standards and design guidance to ensure there are no short-term and high-maintenance sanitary facilities. For instance, 12 automated street sanitary facilities in Kuala Lumpur were provided (Nair & Krisnan, 2014). However, the demolition of such sanitary facilities cost RM 4.8 million because of maintenance and vandalism issues.

Early education regarding sanitary facilities shapes individuals in terms of attitude, habit, and other positive behaviours (Baird et al., 2019; Ahmadi et al., 2020; Axelrod et al., 2021; Manan et al., 2021; Nawawi & Badayai, 2021). Nawawi and Badayai (2021) illustrate that exposing children to sanitary facility education during toilet trainings in early young ages delivers extraordinary benefits. It is preferable with parents' and guardians' roles after school in making this training successful. Children who obtained sanitary facility education and training are also demonstrating independent and favourable attitudes about sanitary facilities and fixtures compared to children who did not receive such education and training. Baird et al. (2019) state that the youngsters as early as 18 months can undergo toilet training with supervision by parents and guardians. Furthermore, they are ready for toilet training when they can talk and walk, are uncomfortable with nappies, and have other variables.

Manan et al. (2021) present the "Knowledge Attitude and Practice (KAP) Theory" in the study to find sanitary facility hygiene among Malaysian university students. The results demonstrate that students had a good degree of hygiene in sanitary facilities, with 87%, 88%, 81% and 79% having knowledge, attitude, practice, and learning in these areas. Currently, sanitary facilities hygiene by Malaysians is at a poor level. This is owing to the majority of public sanitary facilities being in dirty and poor conditions and far from the government's requirements and grade, which is known as BMW: "'bersih' (clean), 'menawan' (attractive) and 'wangi' (pleasant smell)" (Ganesan, 2022; Morden, 2023; Roslan, 2023).

Average water usage is high in Malaysia, with an individual utilising 201 litres per capita per day (AirSelangor, 2021) compared than the required 165 litres per person per day (United Nations, 2020). Water usage, which encompasses behaviours, habits and saving attempts in Southern Malaysia, demonstrates excessive water consumption and little understanding of water conservation among participants (Muhammad et al., 2021). This happened due to low water prices levied by the government and local authorities. The usage

of subterranean water from wells and borings is another factor. The Malaysian government has to take extra initiatives to reduce water use among Malaysians through signage and advertisements (Sun et al., 2021).

Existing gender-specific toilets are thoughtless and discriminatory towards women and children. This is because of the fact that men are primarily in charge of overseeing the standards and design guidance (Jeffreys, 2014; Ramster et al., 2018; Greed, 2019; Colliver & Coyle, 2020). Different information offered between the standards and design guidance employed by the designers has generated ignorance of demands by women and children. For example, the design and provisions of sanitary facilities and fixtures in public buildings (Greed, 2014; Beebeejaun, 2017). Currently, the only sanitary facilities that have been shared by all users are accessible toilets. Besides being built for old and disabled persons, it is for families with children, as changing tables are provided in this facility if a nursing room is unavailable.

Shared sanitary facilities are established to reduce waiting times and unequal sanitary fixtures encountered by females and to avoid bullying, vandalism and violent acts (Earlywine, 2014; Bovens & Marcoci, 2017; van Hautegem & Rogiest, 2017; Wendland et al., 2017). The Malaysian Standard (2017) provides shared sanitary facilities called as “all-gender toilet facility”. However, more research need to be done for shared sanitary facilities because no standards and design guides present examples and references. Acceptance of shared sanitary facilities by the general public must be made. It is assured that appropriate types of sanitary facilities are installed to meet the users’ needs and desires in public buildings.

Research Objective

The research will be conducted to achieve the following objectives: to identify problems at existing sanitary facilities in public buildings, to determine the components and criteria of existing sanitary facilities, and to establish perception and acceptance of existing and shared sanitary facilities. All identifications, determinations, and establishments are based on facility design requirements. For example, the Uniform Building By-Laws 1984, Malaysian Standard and Economic Planning Unit. By closing the gap between the built environment and human behaviour, the development of the design model for sanitary facilities in Malaysian public buildings can meet the users’ needs and needs with proper design and provision of sanitary facilities and fixtures.

Besides the general public as voluntary participants, voluntary experts are added to find awareness and knowledge from the professionals, including architects, designers, regulators and others regarding gender-specific toilets and shared sanitary facilities. If the idea of shared sanitary facilities is declined by voluntary participants and experts, modifications to the standards and design guidance of gender-specific toilets need to be created to overcome challenges with such facilities. So, the design model of sanitary facilities is vital and will benefit all users in public buildings.

METHODOLOGY

This research is utilising pragmatism to identify, determine and establish problems, components, criteria, This research is utilising pragmatism to identify determine and establish problems, components, criteria, perception, and acceptance of gender-specific toilets and shared sanitary facilities in designated public buildings (Leavy, 2017; Hennink et al., 2020). Mixed research methods will be applied to obtain data from voluntary participants (Gray, 2014; Bryman, 2016; Creswell & Clark, 2017; Cohen et al., 2018; Creswell & Creswell, 2018). A triangulation research design will be applied to the data analysis of the research methodologies involved. First, quantitative research methods will be used in the research, and then qualitative research methods. Questionnaires and questions will be created and properly constructed to facilitate the collection of sensitive yet extensive data from voluntary participants and experts (Earlywine, 2014; Kumar, 2019).

Quantitative research methods incorporate a pilot and case studies with questionnaires that feature multiple choices and open-ended questions. The pilot study will be carried out with a small number of voluntary participants within one hour's duration with people at the same site (Bryman, 2016; Kumar, 2019). The method is used to make sure the questionnaire is in correct order and appropriate to be transmitted for the case studies. Through the case studies, target participants are the voluntary general public, since they are the

users of sanitary facilities in selected public buildings over the duration of one week and during operating hours. Meanwhile, qualitative research methods include discussions and interviews with semi-structured questions. For the discussions, a small group of no more than eight voluntary participants, three groups at one community centre and for no more than one and half hours per discussion. It includes all males, all females and mixed genders groups at community centres located in Kuala Lumpur, Putrajaya and Selangor.

Meantime, five professionals from the departments, institutes and firms are targeted for the interviews. For instance, the Malaysian Public Works Department, the Malaysian Standards Department, the Ministry of Economy, architects and designers, and others. The interviews of one professional departments or institute will include three individuals with various genders if possible and for no more than one hour per interview. Voluntary experts from the departments, institutes and firms are included owing to their involvement in approval, development, design, construction and more of Malaysian public buildings.

Data acquired from all study methods is evaluated independently to derive the results. Questionnaires of the pilot and case studies are transformed into digital forms and will be stored on a laptop and a flash drive for backup purposes. SPSS software will be employed to undertake data analysis that includes reliability and validity checks. All audio recordings of the discussions and interviews are transcribed into digital written records. Thorough cross-referencing between audio recorders and digital transcripts will be undertaken to guarantee no words are omitted. The digital transcripts will be transferred to NVivo software for in-depth analysis.

SmartPLS software will be utilised to further examine the results of quantitative research methodologies. The software provides graphical representations utilising the path modelling approach (PLS) and variance-based structural equation modelling (SEM), also known as PLS-SEM (Hair et al., 2019). The bootstrap approach in the software is capable of estimating the confidence interval of a parameter and may successfully address sophisticated challenges in a given instance. This research is valuable, as the results provided are not only relevant to the general public but also to professionals for knowledge and future buildings.

Reasons For Users' Perception Of Sanitary Facilities In Public Buildings

Given that the majority of studies concentrate on problems in female toilets (Greed, 2014, 2016, 2019; Earlywine, 2014; Robert & Greed, 2014; Beebeejaun, 2017; Wendland et al., 2017; Ramster et al., 2018), this research has the opportunity to include male toilets that are not currently the subject of other studies. Here, social norms and acceptability, cultural influence, hand hygiene, and aged and overweight population are causes for users' perceptions of sanitary facilities in public buildings to be vitally described, respectively.

Social Norms and Acceptability

People all around the world have abided by unwritten rules, also referred to as social norms. It makes people behave responsibly towards other people and services (Mackie et al., 2015). For example, in public places, people line because it is a courteous approach to wait patiently and take turns. Furthermore, men and women find it challenging to coexist in limited areas like sanitary facilities, recreation rooms, and changing rooms (Freedman, 2016; Lorde, 2021). There is a reluctance to share such spaces because of worries about violence, vandalism, and bullying as well as variations in hygiene levels (Wendlands et al., 2017). The users' first perception will impact their acceptance of spaces too (Reddy et al., 2017).

If the general public is prepared to accept shared sanitary facilities, concerns like the provision of sanitary fixtures, minimum requirements and dimensions, and the design of sanitary facilities can be overcome (Bovens & Marcoci, 2017; van Hautegem & Rogiest, 2017). Accessible toilets are the only sanitary facility that all users have shared. Such a facility is for aged, disabled persons and parents with children with additional fixtures being put in one unit. Meanwhile, in the United Kingdom, several public buildings have restored or replaced gender-specific bathrooms with shared sanitary facilities. For example, the University of Northampton, the Barbican Art Centre, the Chester Storyhouse and more (Robert & Greed, 2014; Sanghani, 2017; Bovens & Marcoci, 2017; Grafton-Green, 2017; Ramster et al., 2018).

Cultural Influence

The majority of people in emerging and impoverished nations support utilising squat toilets and shower bidets (Greed, 2016; Zayed, 2019). One research by Chen et al. (2021) demonstrates that persons from industrialised nations struggle to accept squat toilets due of objections including clothes being prone to being soiled, challenges with balance, and issues with movements. However, squat toilets offer advantages including no direct touch between the users and sanitary fixtures, no splashing, reduced water usage, natural body posture, and a lower risk of digestive system disorders (Cheng et al., 2018; Bhattacharya et al., 2019; Abney et al., 2021).

Public buildings are endeavouring to add squat toilets and shower bidets in sanitary facilities due to the increasing number of tourists in the United Kingdom (Zayed, 2019). Previously, Napier-Bell (2011) stated that Manchester Airport featured one squat toilet and one shower bidet at each gender-specific toilet, and shower bidets were installed in cubicles of the first-class restrooms of British Airways' lounges at Terminal Five in Heathrow Airport. A decrease of damaged and filthy water closets, and damp floors in sanitary facilities may be notes with the installation of such sanitary fixtures in both airports.

Overall, some people still choose to use squat toilets and shower bidets in cubicles when spending time out in public facilities. Perceptions from the general public are essential in making sure the right provision of sanitary fixtures is installed in sanitary facilities to reduce damages, to keep clean and to maintain the government's standards for the users' safety when entering, using and exiting sanitary facilities in public buildings (Thye, 2019; Ganesan, 2022; Morden, 2023; Roslan, 2023; Wan Shaberi et al., 2024).

Hand Hygiene

Hand hygiene is necessary after using cubicles and stalls to prevent the transmission of bacteria and viruses. However, compliance with this approach is typically inadequate (Suen et al., 2019; Couturier et al., 2020). In 2015, research by Davies indicated that 40% of females and 62% of males admitted to not washing their hands after using cubicles and stalls. Meanwhile, the World Health Organizations (2023) proposes spending 20 to 30 seconds using an alcohol sanitiser and 40 to 60 seconds using soap and water to clean hands. These behaviours can decrease the spreading of germs and viruses to other individuals and environments.

One hand hygiene study comparing genders demonstrates that females had higher hand hygiene than males (Suen et al., 2019). The study involves hand-drying methods to determine the public's knowledge and behaviour. Females with categories of mature and tertiary education are educated about hand hygiene, however hand drying methods need more guidance for both genders. Although 15 years of hand hygiene have been implemented in Hong Kong, there are portions of the hands that are neglected during cleaning (Wong & Lee, 2019). For instance, the fingertips, palm areas and back of the hands.

Now, it is typical to see hand dryers installed adjacent to hand wash basins in sanitary facilities. Besides being cost-effective, it is also environmentally benign compared to paper towels (Haynes, 2014; Joseph et al., 2015). Two studies confirm that hand dryers are appropriate for installation in public buildings and spaces, with the exception of healthcare and food processing facilities (Alharbi et al., 2016; Kimmitt and Redway, 2016). It is owing to the high level of hygiene that must be maintained to avoid bacterium and virus contamination. Still, hand dryers emit loud noise that interferes with those with hearing aids (Berkowitz, 2015; Drever, 2017; Fletcher et al., 2018; Fasulo et al., 2020; Leighton et al., 2020) and cause skin displeasures such psoriasis and eczema (Huesca-Espitia et al., 2018; Gião & Vardoulakis, 2022). Most studies indicates that hand dryers are superior to paper towels.

Aged and Overweight Population

A nation's progress with the welfare of its population. Active and healthy individuals have the capacity to earn revenue for themselves and their nations (United Nations, 2023). Nonetheless, a surge in aged and overweight populations could bring problems to individuals and nations. The normal size of spaces is inadequate for the elderly and overweight individuals, impacting their mobility and safety (Kalyani et al., 2014; Jura & Kozak,

2016; Izquierdo et al., 2021).

The World Health Organization's figures reveal that in 2020, there will be more adults aged 60 years and older than youngsters aged five years and younger. Additionally, the frequency of obesity and overweight adults globally grew almost thrice between 1975 and 2016, according to the World Health Organization' s report in 2021. The organization considers those aged 60 years and older as elderly and those between 18 and 59 years as adults. A body mass index (BMI) of 25 or above denotes obesity, and a BMI of 30 or higher suggests overweight. In 2020, it was predicted that there are one billion senior individuals, with forecasts of 1.4 billion in 2030 and 2.1 billion in 2050. There are 1.9 billion people and roughly 650 million individuals who are overweight or obese.

Malaysia ranks 45th out of 50 countries in terms of the ageing population, with a total of 2.11 million elderly people (Population Reference Bureau, 2019). The top five countries with the largest percentage of older people in the world are Japan (28%), Italy (23%), Finland, Portugal, and Greece (22%). Malaysia does not have an ageing population because children, adolescents, and adults outweigh the old (Ismail et al., 2021). As the population ages, discrimination against individuals with diseases, physical disabilities, syndromes, and other characteristics that restrict their skills, and autonomy is a growing problem (World Health Organizations, 2022). Governments, non-profit groups, family members, and others can all assist to tackle these difficulties. For instance, shift the viewpoint of older people and establish communities customised to their needs and those of others (World Health Organizations, 2020b).

Chong et al. (2023) discovered that 50.1% of adults in Malaysia are overweight. In 2019, 38.2 million children globally are overweight or obese, with approximately half residing in Asia. In 2016, almost 340 million children and adolescents ages 6 to 19 were overweight or obese. Overweight and obesity come from an imbalance between calorie consumption and expenditure, consumption of processed foods and drinks, and lack of physical activity (Chong et al., 2023). Maintaining a healthy lifestyle, which includes eating and drinking in moderation, limiting the intake of fat, salt, and sugar, and engaging in physical activity to burn calories, can nonetheless avoid overweight and obesity (World Health Organizations, 2020a). By adopting such precautions, individuals can prevent cardiovascular problems, musculoskeletal ailments, diabetes, and cancers.

Elderly and overweight individuals greatly affect public structures, notably sanitary facilities. Factors such as cubicle size, type of sanitary fixtures, and others must be examined to satisfy the demands of these groups (Ismail et al., 2021; Chong et al., 2023). When creating sanitary facilities for public buildings, it is vital to consider the physical limits and size of humans. To summarise explanations for the users' perspective of sanitary facilities in public buildings, all terms used in this overview are tabulated in Table 3.

Table 3. Definition of terms

Term	Definition	Reference
Sanitary facilities	It is a space which provides accommodation to people who need to urinate, defecate, do hand washing, and do other activities that include water as a cleaning agent. It can be either private or public with one or more toilet units located indoors or outdoors and need to be in clean conditions as possible for the health and safety of the users.	Department of Standards Malaysia, 2017; British Standards Institution, 2006, 2010; and Andy, 2020.
Components	Fittings or fixtures or appliances included in sanitary facilities like water closets, squat toilets, urinals, taps with hand bidets, and others for the users to use. Components in sanitary facilities are connected either to piping or electrical systems at all times during opening hours.	Department of Standards Malaysia, 2017; and British Standards Institution, 2006, 2010.
Criteria	The design of sanitary facilities needs needs followed by buildings and construction professionals to sure the health and safety of the users starting from entering, using sanitary fittings and exiting sanitary facilities.	Department of Standards Malaysia, 2017; and British Standards Institution, 2009, 2010.

Perception	Ideas, beliefs or images given by the users that show conditions and impressions of sanitary facilities. It is essential because the users can provide data on sanitary facilities in detail as they are the end users based on their experiences.	Department of Standards Malaysia, 2017; and British Standards Institution, 2010.
Acceptance	An act of tolerating new data or things by individuals, such as type of sanitary facilities and fittings. Acceptance of types of sanitary facilities and fittings is important for current and future public buildings to accommodate users' needs.	Department of Standards Malaysia, 2017; and British Standards Institution, 2006.
Facilities design	Composition and layout of areas and spaces involved in external and internal structures starting from ideas on paper to completed buildings or services. Facilities design requirements are the existing standards, by-laws, design guidance and more that are used as referrals and references by building and construction professionals.	Heragu, 2018; Atkin and Brooks, 2021; Department of Standards Malaysia, 2017; and British Standards Institution, 2006, 2010.
Sustainable sanitary facilities	Good arrangement and design of sanitary facilities that compromise all fittings and criteria in spaces for all users to use. It is not just user-friendly and needs that have to be incorporated, but also low environmental impact and economic of sanitary facilities and fittings.	Greed, 2016; Heragu, 2018; and United Nations, 2023.
Gender-specific toilets	A sanitary facility is particularly designed separately for males and females and is expected to be entered based on gender. The difference between female and male toilets are urinals which make males have choices between water closets and urinals to urinate.	Department of Standards Malaysia, 2017; and British Standards Institution, 2006.
Shared sanitary facilities	One or separate space of sanitary facility that is accessible to enter and use by all users at one time.	van Hautegem and Rogiest, 2017.
Public sanitary facilities	The structure that owned by the government and can be located either indoors or outdoors with one or more toilet units. It provides accommodations to the general public to clean with water as a cleaning agent. It must be in clean and dry conditions during opening hours and can be managed either by the governments or private entities.	Department of Standards Malaysia, 2017; and British Standards Institution, 2006, 2010.
Public buildings	Structures and properties which are owned by the governments can be entered and used by the general public for varieties of activities and usages with or without permissions depending on activities the regulations.	Department of Standards Malaysia, 2017; and The Building Regulations, 2015

FINDING AND DISCUSSION

This research presents a complete examination of overview from the users of sanitary facilities in public buildings, combining significant information from collected studies and references. It is necessary to acquire data from the general public and experts regarding sanitary facilities, as they are end users and people who are educated in these fields. Here, finding and discussion of overview are further detailed in depth, respectively.

Finding

Unspoken and untold problems by the general public regarding existing gender-specific toilets in public buildings are reality that need to be identified and faced. There are academic studies of sanitary facilities, yet it focuses more on females rather than males and other users (Greed, 2014, 2016; Earlywine, 2014; Beebeejaun, 2017; Wendland et al., 2017; Ramster et al., 2018; Isham et al., 2022). At this stage, problems are faced by the users in existing gender-specific toilets, conservation fittings in sanitary facilities, and arrangement and design of sanitary facilities by facilities design requirements. Fairly often students view that female toilets have more problems compared to male toilets (Greed, 2014, 2016, 2019; Earlywine, 2014; Robert & Greed, 2014;

Beebeejaun, 2017; Bovens & Marcoci, 2017; van Hautegem & Rogiest, 2017; Wendland et al., 2017; Ramster et al., 2018). Nevertheless, it is the opportunity for this research to find problems in male toilets that are not covered by other studies.

The first obvious problems with gender-specific toilets, especially female toilets, are queues due to the small number of cubicles that are unable to cater to the number of users during hectic hours and peak days, for example, during opening and lunch hours and weekends. Besides the small number of cubicles in female toilets, several reasons like small cubicle size, provision of sanitary fixtures, pregnancy, menstruation, clothing, companionship and more, as well as known females spending twice as much time in toilets compared to males (Goldsmith, 2000; Greed, 2014, 2016, 2019; Bovens & Marcoci, 2017; van Hautegem & Rogiest, 2017; Ramster et al., 2018). Long waiting times, specifically more than two minutes, impact people like pregnant women, elderly people, disabled people, children and ethnic minority communities (British Standards Institution, 2009). It can cause health issues, such as urinary incontinence, bladder and bowel complications and more.

The size of cubicles is one problem, as a clearance area between a water closet or squat toilet and the door is small and becomes an issue for pregnant women, women with companions like children, elderly people and overweight people (Greed, 2014, 2016). Space between the water closet, sanitary pad bin and paper roll dispenser can create unhygienic conditions when either the water closet, sanitary pad bin, paper roll dispenser or all fixtures are in dirty states. Plus, it can spread bacteria and viruses to the users. The width and length of the cubicle need to be increased to make sure there is less contact between the users and sanitary fixtures. The standards and design guidance need to solve this issue with one size that satisfies all users rather than two different sizes, as in Table 1.

Not to mention, choices between water closet and squat toilet, tap with hand bidet and installed bidet, cold or hot hand dryer, and more need to be addressed, as the provision and number of fixtures need to satisfy users' demands and needs that can impact their health and safety when using sanitary facilities in public buildings. Water conservation adaptations and awareness, such as water-saving plumbing fixtures, dual-flushing water closets, water-saving showerheads, auto-sensor flushing systems and other plumbing fixtures that are available in the market that can be fitted in public buildings (Liu et al., 2022). Anyone, anywhere, can contribute to water conservation without having to behave differently depending on the building, location, types of plumbing fixtures and so much more.

At the hand wash area, the type of hand wash basin tap installed is easy to use and injury-free when it is used by the users. To ensure the handwashing area is dry, aerators can be installed on handwash basin taps to produce low-flow water that can cut down the water consumption (Umesh & Sitaram, 2014; Hasnol & Ahmad Zaharuddin, 2020; Jakubczak, 2020). The study by Hasnol and Ahmad Zaharuddin (2020) was able to reduce water consumption from five litres per minute to two and a half litres per minute from stage one to stage three. It reveals that aerators are not just good for water consumption but can also prevent dirt and mould in pipes. Added to that, signage at the hand wash area plays an essential role in increasing hand washing among users (Lunn et al., 2020; Sutherland et al., 2021). Arrangement of soap dispensers, paper towel dispensers and hand dryers that are closer to hand wash basins can overcome wet and slippery floors, which can lead to injury to the users.

There are technologies like sensors on water closet seats that can be included in public sanitary facilities for users' benefit. For instance, to alert janitors when sanitary facilities need to be cleaned after certain times and the users can locate sanitary facilities that clean and available (Ramasany *et al*., 2018), to detect users' posture when using water closets and squat toilets (Lokman and Ramasamy, 2019), to acquire users' comfort level with sensors applied in sanitary facilities (Raendran *et al*., 2020) to get health check like urinary incontinence, bladder, bowel complications and more (Wang and Camilleri, 2020), to reduce long queue and waiting times (Alfonso *et al*., 2022), to detect sanitary fittings malfunction and to determine number of janitors needed (Lokman *et al*., 2023) and a lot more. Besides that, Ramasamy *et al*. (2018) reveal that sensors attached in sanitary facilities can also give data on the mean time per person use of the sanitary facility, mean times of every sanitary facility used monthly and the mean time the janitor takes to clean the sanitary facility.

Last but not least, hand drying before egressing sanitary facilities. Users can choose between paper towels and hand dryers that are usually available at the handwashing area as hand-drying agents. Studies exhibit that hand dryers are better than paper towels because they are cost-effective and environmentally friendly (Joseph *et al*., 2015; Alharbi *et al*., 2016; Kimmitt and Redway, 2016; Reynolds *et al*., 2020; Dyson, 2023). However, there are users who preferred paper towels, followed by hand dryers and cloth towels, due to noise and skin displeasures (Drever, 2017; Huesca-Espitia *et al*., 2018; Fletcher *et al*., 2018; Gião and Vardoulakis, 2022). It is the best for the users to dry their hands either with hand dryers or paper towels after washing their hands. The act of hand drying can reduce the spread of bacteria and viruses to other locations, food, children and more.

Overall arrangement and design of sanitary facilities need to be considered and evaluated, whether they follow users' needs or just meet the minimum requirements stated in the standards and design guidance (British Standards Institution, 2009; Department of Malaysia Standards, 2017). It is the best when spaces like sanitary facilities in public buildings are arranged and designed to accommodate all users, either with gender-specific toilets or shared sanitary facilities (van Hautegem and Rogiest, 2017; Greed, 2019; Isham *et al*., 2022; Rosie, 2023). The appropriate type, provision and number of sanitary fittings and facilities in public buildings enable the general public to spend more time with comfort and ease.

As users' needs are fulfilled, usage and waiting times might be decreased as arrangements and designs of sanitary facilities are better in public buildings, especially at female toilets. As females spend twice as much time in sanitary facilities compared to males, supposedly the number of sanitary fittings in female toilets is double or triple to avoid queues during hectic hours and peak days (Greed, 2014, 2016; Beebeejaun, 2017; van Hautegem and Rogiest, 2017). Besides that, the British Standard states a waiting time of more than two minutes is intolerable and can cause discomfort and disease to users (British Standards Institution, 2009). Good arrangement and design of sanitary facilities not only attract the general public to enjoy and experience a longer stay in public buildings but also tourists who visit Malaysia.

Discussion

From this overview, all people who are involved in processes of planning, constructing, regulating and utilising any buildings can contribute to the life span of the buildings and safety for the users. Execution of the standards and design guidance throughout design and construction phases can detect building conditions and categories of users in advance. For sanitary facilities in public buildings, placements of sanitary facilities are as significant as the type, design, arrangement and provision of sanitary facilities and fixtures. This is because the users' safety and security are crucial when using sanitary facilities and fixtures to avoid any mishaps and injuries.

When all standards and design guidance are fulfilled in public buildings and sanitary facilities, then vital aspects like sanitary facility education, hygiene and water usage may be implemented to the users. Such nuances can not only sustain sanitary facilities and fixtures in dry and pristine states but also bring people comfort when utilising them. Any new buildings would like to install new fixtures that can be unpleasant and unfamiliar for some people. To avoid damages and injuries to the users, signage performs the crucial role in teaching on how sanitary fixtures function. The users must also enable themselves to be educated with new sanitary facilities, fixtures and technology in any buildings, making sure they are able to adjust with new materials offered.

This research is probing into a mixed research methodologies approach to identify, determine and establish problems, components, criteria, perception and acceptance of existing gender-specific toilets and shared sanitary facilities in Malaysian public buildings. Even if the general public in public buildings are approached to gather input from them via questionnaire, for the participants aged 18 years old and below, approvals from parents or guardians are needed beforehand. Added to that, many voluntary participants request to answer questionnaires not at the sites but when they are free. As Malaysia does comprise people of the diversity backgrounds of religions, races and beliefs, shared sanitary facilities are not suggested to be installed in public buildings, and changes need to be made to existing gender-specific toilets.

Besides chosen public buildings in Kuala Lumpur, sanitary facilities for other public buildings including pre-, primary and secondary schools, educational institutions, institutional buildings, religious structures, and more can be proposed for future research. When more public buildings are involved in research, more data can be acquired, and data can provide adequate designs for sanitary facilities and provision of sanitary fittings for specific public buildings which are available to the general public. Furthermore, it can provide new data to Malaysian standards and design guidance.

CONCLUSION

There are several governments of developed nations who avoid the problems of gender-specific toilets by resolving them with shared sanitary facilities without approval from end users (Patey, 2022; Shreve, 2022). Academic studies primarily concentrate on the utilisation and waiting times related to the design and provision of sanitary facilities and fixtures (Bovens & Marcoci, 2017; van Hautegem & Rogiest, 2017) and problems at female and accessible toilets (Jeffreys, 2014; Greed, 2014, 2016; Earlywine, 2014; Beebeejaun, 2017; Isham et al., 2022). Previous and present studies largely concentrate on design and provision but often fails to bridge the gaps between the two subjects.

Despite the rising volume of literature on sanitary facilities, there is a shortage of academic publications and journals that address problems, components, criteria and perceptions towards existing gender-specific toilets, as well as the acceptability of shared sanitary facilities in public buildings. Sanitary facilities in public buildings are employed in the quantitative research methodologies since the users prefer to enter sanitary facilities located indoors compared to outdoors (Talha 2015; Nazir et al., 2019; Manan et al., 2021; Isham et al., 2022).

Suitability plays the crucial part in maintaining any building, especially sanitary facilities, as water is involved in them (Talha, 2015). Plus, suitable sanitary facilities must be in the right locations with proper management and the users' attitudes for lengthy periods of operation (Nair & Krisnan, 2014). Early and continual education on sanitary facilities can overcome problems including broken sanitary fixtures and bad behaviours (Bairds et al., 2019; Ahmadi et al., 2020; Axelrod et al., 2021; Manan et al., 2021; Nawawi & Badayai, 2021).

This research is noteworthy owing to the presence of voluntary general public and experts who helped identify problems, determine components and criteria of existing toilets, and establish perspectives and acceptances of existing gender-specific toilets and shared sanitary facilities. This research has the opportunity to generate the good model design for sanitary facilities in public buildings by applying methodologies applied to voluntary participants. The focus is on existing gender-specific toilets and shared sanitary facilities, with an emphasis on perception and acceptance.

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