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paper text:

Research Jourml of Applied Sciences 11 (8): 671-676, 2016 ISSN: 1815-932X Â© Medwell Jourmls, 2016 Users' Preference of Eco-Interior Approach in Public Toilet in Surabaya Pumama Esa Dora Tedjokoesoemo and Sherly de Yong Department of Interior Design, Petra Christian University, 60235 Surabaya, Indonesia Abstract: In its efforts to become J'vfICE city, the existence of mall becomes inseparable from Surabaya. With a design that aims to meet users' comfort and satisfaction, the use of public toilets become important to accommodate the needs of various groups of people with different social behavior. Therefore, it is important to know what aspects of design, especially in ecological friendly design, that is significant to meet the convenience of users. Furthermore, this study will help the stakeholders to decide which area of investment should be made inrespect of users' needs and distribution of points ingreen building assessment system. This study was conducted using quantitative data collection method in order to present trends, attitudes or opinions of a population by examining a sample of the respective population. The result showed that public toilet users tend to put more interest on thermal, visual and IAQ mandates that immediately give comfort sensation and creates atmosphere in particular room, even though hygiene and sanitation are highly socialized and campaigned. Key words: Public toilet, eco-interior, building mandates, atitudes, satisfaction INTRODUCTION Once I Gede Ardika (former Minister for Culture and Tourism in Indonesia) stated that a colll1try without proper public toilet is a collllt:ry without culture. Public toilet is defined as a special designed room, complete with closet, water supply and other clean, safe and hygiene amenities to meet public needs to urinate or any other activities related to self cleaning. As one of the busiest ports in the collllt:ry and the second most populous city in Indonesia, Surabaya is home to many offices and a business center. This city also emiched by shopping centers and malls that has grown rapidly during the last decade. The vast development of retail and mall and the increasing mobility conducted has made the need for public toilets increase. Indonesian Toilet Association (ATI) states that any person who is outside their house will definitely use public toilet facilities of > 1 time per day. In response to the development of environmentally friendly design and better sanitation awareness, ATI released steps that can be taken to design a better toilet. However, the steps given were limited to water saving strategies in relation to water fixtures choices. This may only cover 1 out of 9 building mandates that are available to create a well performing design. The common llllderstanding that public toilet main concern is sanitation may need to be reevaluated as users' trends of activities conducted inside public toilet may also change. Therefore, this research was conducted to study user behavior and how the aspects of ecoâ€ interior being assessed of their importance in mall public toilets in Surabaya. By knowing the performance of ecoâ€ interior aspects in shaping the perception of convenience to users, stakeholders will be expected to have a guide and better considerations for future

toilet design. This consideration will also help them to determine future investments, especially in relation to green building assessment. Eco-interior and building mandates: Architecture and interior design is a field that manifests itself, as a concrete part of sustainable development. Eco-design in applied architecture and interior design are called eco-architecture and eco-interior. The ecology concept in eco-interior approach will take into accollllt the relationship of human space environment as an ecosystem. Environmental friendly design can be interpreted as a space designed in which not merely refers to physical criteria alone, fllllction and arrangement of space, but also take into consideration of environmental conservation criteria (globally) which has the characteristics of energy Corresponding Author: Purnama Esa Dora Tedjokoesoemo, Department of Interior Design, Petra Christian University, 60235 Surabaya, Indonesia 67 1 efficiency, sustainable design and holistic approach. In the context of global environment conservation, healthy interior is one of the implementation of green architecture principal the principal of respect for users in particular. The understanding of architecture and interior design that are different from one to another take the building mandates (aspect to be considered in design) to a non-prescribed approach. As the needs to also incorporate the awareness of ecology inside since design planning stage, built environm ent are now required to perform thoroughly. The consideration of design requires an integrated system and processes as shown in Fig. 1. There is several of building requirements needed to be considered. In total building performance (TBP) approach, the mandates cover 6 areas as follow: spatial, thermal, acoustic, visual/ lighting, building integrity and Indoor Air Quality (IAQ) (Oyedele et al., 2011). Kusumarini wrote, specific to interior context, that the mandates will cover 8 areas as follow: organisation of space, material selection,

lighting system, ventilation system, water sanitation, indoor air quality, **electromagnetic emission** and **waste management.**

Ecological design approach in toilet: There are some criteria to achieve eco-toilet.According to ATl, here are some applications of ecological design in toilet. Paper products: â€¢ Using products made from recycled toilet paper and to encourage the use of automatic hand dryers â€¢ To use biodegradable trash bags Water: â€¢ To use low flush toilet Otherwise, water transfer can be installed or to consider replacement with a water-saving toilet or alternatives like dual flush system or a toilet that can turn waste into compost â€¢ Lower the flow of water at the tap or using the automatic faucet types â€¢ Use the shower head with efficient water discharge Health: â€¢ Using the non-toxic cleaning products â€¢ Ensure good ventilation system â€¢ Lighting â€¢ Wherever possible use natural lighting. But if not, artificial lighting with LED system is preferable Material: â€¢ Using no VOCs or low VOC levels paint Using alternative materials that are environmentally friendly and fast growing as a rug or floor covering material Total Building Performance â€¢ Spatial â€¢ Vsiual / giLhting â€¢ Thermal â€¢ Bulldlng Integrity Integrated Integrated Systems Processes â€¢ Phyalok>glcal â€¢ Sutlablllty â€¢ P1ychok>gclal â€¢ Rellablllty â€¢ Soclologlcal â€¢ Flexlbllity â€¢ Economics Fig.1:ConceptualframeworkofTBP(Oyedeleetal.,2011) Relationship with nature: â€¢ Applying plants for aesthetic elements and to serve as natural air filters â€¢ Signage and reminder instalement for natural resources conservation MATERIALS AND METHODS This study was conducted using quantitative data collection method in order to present trends, attitudes or opinions of a population by examining a sample of the respective population. This research methodology was started by disseminate survey to public toilet users by random sampling method . At a later stage, the study will be continued by calculating each survey answer to come with ranking of eco-interior mandates performance that are viewed from the most important to the least in meeting users' need and comfort. The last stage of data collection is interview with some of the participants in random order to get better understanding. Based on those building mandates mentioned in section 2, this research will re- evaluate 9 eco-interior mandates with parameters as per follow: Visual:

Assessment of lighting system design perfo1mance based on the intensity, color rendition, contrast and atmosphere creation. Spatial: This mandate is related to organization ofspace. The assessment parameters are adjacencies, accessibility, signage system and way finding, efficiency and ergonomics. Thermal:Theassessmentofventilationperformanceis based on air temperature, humidity, air velocity and radianttemperature. Acoustic: The acoustic performance will be assessed by its solllld pressure level, audibility and availability of echo to represent reverberation time. Building integrity: This section is related to material selection. The assessment parameters are degradation in vicinity, suitability and durability. Indoor Air Quality (IAQ): The IAQ performance will be assessed by it ventilation rate, availability of access to fresh air and indoor pollutant. Water sanitation: This mandate will be assessed by the awareness of water conservation strategy implemented, hygiene and sanitation (e.g., keeping the toilet dry), fixture design, availability of sensor and availability of hot/cold water option. Waste management: This mandate will be assessed based on efficiency of waste separation strategy, hygiene level, effort to achieve hygiene condition and accessibility to trash bin. Electromagnetic emission: This mandate will be assessed based on the availability of internet and connectivity in the vicinity. Each mandates will be assigned with certain points based on their rank in particular mall. The more important it is, the higher the score given. The score will range from 1 given to rank 9 as the lowest and score 9 given to rank 1 as the highest. The general listing will be taken based on score accwnulated to see the highest as the most important. RESULTS Surabaya is divided into 5 regions: Centre of Surabaya, North Surabaya south Surabaya, West Surabaya and East Surabaya. Each region usually equipped with one mall as city landmark. However, in this study, shopping center located in North Surabaya will be eliminated due to its highly different nature of activity. The first mall to assess located in South Surabaya which located at the border of Surabaya and Sidoarjo and relatively close to the airport. This mall also has offices towers and private mriversity tower as well as apartment integrated. The sWTollllding of this mall are offices towers, well established private mriversity, residential and apartment towers soon to build. Therefore the visitors of this mall generally are the transit people that about to come or to leave the city, student, office workers at daytime and family at night The mall tenants are generally serves for mediwn brand goods ranging from clothing, book, foods and entertainment. The public toilets of mall I are designated as dry toilet with separation by gender. Though, in practice, they are still folllld in wet conditions. Apart from general public toilet, mall 1 provides nursery rooms for infants as well with complete basic amenities. However, there is no public toilet for the disabled available. The survey result for this mall is sorted from the most important to the least â€¢ IAQ â€¢ Thermal â€¢ Visual â€¢ Spatial â€¢ Water sanitation â€¢ Acoustic â€¢ Waste management â€¢ Building integrity â€¢ Electromagnetic emission The second mall is located at the Centre of Surabaya. This mall is the pioneers of mall in Surabaya and keeps on growing. This mall has become the landmark of the city. The mall has grown to become a complex consisted of 5 stars hotel and serviced apartment and office tower. Located in the CBD area, this mall is surrolllded by a lot of business facilities such as luxury and business hotels, office towers, exhibition halls, showrooms, musewn and government buildings. The visitor of this mall are vary and ranging from all ages. This mall serves as family mall and on weekend more youth come as the location is close to the youth center. The tenants are generally serves for mediwn to high end branded goods with wide range of product selection available. The public toilets of mall 2 are designated as dry toilet with separation by gender. In practice, each level and section of public toilets available in mall 2 generally equipped with 1 cleaning service to keep the toilet clean and dry. Apart from general public toilet, this mall also provide toilet for the disabled. The survey result for this mall is sorted from the most important to the least: â€¢ Thermal â€¢ IAQ â€¢ Visual â€¢ Spatial â€¢ Building integrity â€¢ Water sanitation â€¢ Waste management â€¢ Acoustic â€¢ Electromagnetic emission The 3rd mall located in the oorder of South Surabaya to West Surabaya. This mall is unique due to its design which incorporates open outdoor area inside the mall. Mall 3 visitors ' are mainly the adults who come for movies, food and watch football together (nobar- nonton bareng)

occasionally. This mall also integrated with hotel and located near military residential, sport field, hospital, showrooms and stores. This mall allows their visitors to smoke. Unlike the other mall, this mall operates up to midnight and the tenants are generally serves for foods for medium market share. The public toilets of mall 3 are designated as dry toilet with separation by gender. Generally the toilets in mall 3 are kept in dry condition even though the cleaning service may not always present like in mall 2. However, there are no designated spaces given for nursery and disabled. The survey result for this mall is sorted from the most important to the least: â€¢ Thermal â€¢ IAQ â€¢ Visual â€¢ Waste management â€¢ Water sanitation â€¢ Spatial â€¢ Building integrity â€¢ Acoustic â€¢ Electromagnetic emission The 4th mall located in the west of Surabaya. Designed as a complex together with apartment towers and located near residential precinct and schools, this mall aiming families and teenagers as their main visitors. During the day, its visitors are dominated by teenagers and young mothers. During the evening, its visitors dominated by families. The mall tenants are generally serves for medium brand goods ranging from clothing, book, electronics, to foods and entertainment. The public toilets at mall 4 are designated as dry toilet with separation by gender. In practice, each level and section of public toilets available in mall 4 generally equipped with 1 cleaning service to keep the toilet clean and dry. This mall also provides nursery rooms at some levels, but not every level has disabled toilet. The survey result for this mall is sorted from the most important to the least: â€¢ Visual â€¢ Thermal â€¢ Water sanitation â€¢ Acoustic â€¢ IAQ 2% Fig. 2: Users' preference chart â€¢ Spatial â€¢ Waste management â€¢ Building integrity â€¢ Electromagnetic emission â€¢visual â€¢Thermal â€¢Acoustic â€¢Spatial â€¢BuildingIntegrity â€¢IAQ(1ne1oorAirQuaity) â€¢Waste Management Water Sanitation ElectromagneticWaste The last mall located in East Surabaya. This mall also considered as the early mall to open in the city. Located in the middle of residential area and 2 public universities , this mall targets families and adults as their main visitors. Mall in this area may not grow as rapid as the other part of the city but this mall maintains its selection of tenant to be available earliest in the city. The mall tenants are generally serves for medium to high end brand goods ranging from home supplies and accessories, clothing, book, electronics, to foods and entertainment. The public toilets at mall 5 are designated as dry toilet with separation by gender. In practice, each level and section of public toilets available in mall 5 generally equipped with 1 cleaning service to keep the toilet clean and dry. This mall also provides nursery rooms at every levels and disabled toilet at every level as well. The survey result for this mall is sorted from the most important to the least: â€¢ Visual â€¢ Thermal â€¢ IAQ â€¢ Water sanitation â€¢ Acoustic â€¢ Spatial â€¢ Building integrity â€¢ Waste management â€¢ Electromagnetic emission The recapitulation and general listing of these 5 malls ranks presented at Fig. 2. DISCUSSION The mandates rank shows some common trends in mall 4 and mall 5 which have family based visitors. The ranks show that thermal comfort and visual mandates are the most favorable mandates. "Whereas at mall 2 and mall 3 the trends slightly different by putting thermal comfort, IAQ and visual mandates as the most favorable mandates. Even though hygiene and sanitation are highly socialized and campaigned, the smvey results showed that these 2 parameters (which are covered llllder water sanitation and waste management), to be less selected by the users. This phenomenon caused by higher education level and the hygiene behavior that the mall users have been kept in daily basis. Mall public toilet users tend to put more focus on thermal, visual and IAQ mandates that immediately give comfort sensation and creates atmosphere in particular room. On thermal mandates, most of users' expectation falls on how to keep the room temperature at stable and cool condition. Therefore all mall samples put air condition mrits, whether it is split llllit or centralized one. Users may not take the availability of fresh air or the ability to have direct access to fresh air is important as long as the air temperature kept stable at cool and well hwnidified. The second on list is visual mandates related to lighting design system. Users' expectation falls on intensity and atmosphere creation with certain warmth lighting color sensation. Color rendition and creation of contrast are not seen as too important. For IAQ, users' expectation falls on the odorless room. The public toilet is not expected to smell good by giving artificial air

freshener nor any plantation to improve IAQ. Users also find that the availability of air conditioning mrit inside public toilet as favorable and give assurance that the public toilet is comfortable as well as increasing the image of related mall. On the other hand, water sanitation and hygiene are considered important by the users but the measurement only on how clean the water, how dry the room which related to the availability of cleaning service and availability of sensor system. The availability of recent technology is viewed and related to better brand image of the mall. In respect to these top 3 mandates chosen by the users, they are actually in accordance with points given in general green building certification systems. Some international green building certification systems have been selected to have their points' distributions compared. The top 3 main environmental issues folllld in most of green building certification systems are energy, IEQ and material conservation. Energy is considered as the most important parameter in most of cwrent green building rating system. In average, energy efficiency is still considered as the most important issue. Energy category in green building certification is strongly related to active system (Dora, 2014). As the top 3 users' preferences of eco-interior mandates fall into thermal, visual and IAQ and their expectation of air conditioning mrits and any active system approach to maintain their performance stable, it is make sense for the industry and stakeholders to put investment on electricity related miscellaneous. However, additional of electricity related miscellaneous for air conditioning (thermal), lighting design and maintaining the IAQ will increase carbon footprints, energy conswnption and at the end of the day the cost for both initial investment and maintenance. But since the green building points in energy category is calculated by the difference between common design and proposed design, the use of recent energy savmg equipment may come as a solution. CONCLUSION The general rank for users' preference of eco-interior mandates sorted from the most important to the least is: â€¢ Thermal â€¢ Visual â€¢ IAQ â€¢ Water sanitation â€¢ Spatial â€¢ Acoustic â€¢ Waste management â€¢ Building integrity â€¢ Electromagnetic emission The top 3 rank are occupied by mandates that are highly close to active design approach. Active approaches are viewed as a solution to keep a stable condition. In public places such as malls, the availability of recent active approaches technologies is viewed as a good decision by the users and investors. The availability and the use of recent technologies increase image of the mall in the eyes of the users and giving assurance of convenience and comfort. To bridge the needs of brand image and the needs to contribute in ecologically friendly commmrity, wise design approach is needed to integrate passive system to the needs of users. The use of electricity related equipment to maintain indoor environment quality through thermal, visual and IAQ mandate will increase carbon footprints, energy conswnption and cost. But since the green building points in energy category is calculated by the difference between common design and proposed design, the use of recent energy saving equipment may come as a solution. ACKNOWLEDGEMENT This research was supported by

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