

# ARCHITECTURE BEHAVIOUR OF OUTDOOR SPACE DESIGN FOR VISUALLY IMPAIRED PEOPLE

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## ABSTRACT

*Indonesia has placed second position for the number of visually impaired people compared to all other countries for international scale. Visually impaired is count as one of the worst disability. Limited vision among visually impaired people has dropped their confident to certain low level, it turns them into silent and shy. In order to increase their contribution level of confident, it takes a media to accommodate special needs for them, especially in mobility aspect. The study aims to design an outdoor space that could help visually impaired people to do their daily activity become easier, safer, and more comfortable. Within descriptive exploration method through literature and field study, the design of outdoor space concept for visually impaired people is invented. Result of study reveals that outdoor space design must also concern about daily behaviour of visually impaired people who mostly not use vision but hearing, touching, and smelling. An outdoor space design could include mini waterfall on it to support the hearing visibility, meanwhile the touching aspect could be supported by building handrail or guide-wall. Also, planting certain strong good-smelled flowers could improve the smelling aspect.*

**Keyword:** Visually Impaired People, Behaviour, Outdoor Design.

## INTRODUCTION

According to data by ministry of health of Indonesia, amount of visually impaired people in Indonesia is 1.5% from total Indonesian population. It means if Indonesia currently has 250 million citizens, there are 3.700.000 of visually impaired people within numerous categories (Pertuni, 2017). Eight years ago, the number of visually impaired people in Indonesia reached 3,5 million people (merdeka.com, 2012). The number is equal of total citizen of Singapore. With this high number, Indonesia placed second in international scale, whereas the total of world visually impaired people is 45 million. High amount of these impaired people must be followed by significant infrastructure to support their mobility. Equally, visually impaired people possessed the same right as other normal people received, they must have same chance to contribute their role in society as well as they must have equal right for their safety and comfort in mobilisation. According to previous statement, in order to provide them with safety and comfort in executing their daily activity, a design that meets their visually impaired condition will be suffice to support their comfort and safety level while contributing in society. This idea is supported by Broadbent (1981) in *Design in Architecture* who stated that architecture must be able to follow its function in providing comfort and safety for its users in daily activity. This study is limited to outdoor design only because outdoor space is first gate to guide people from A to B. Visually impaired people is usually different from other normal people, not only because of their physically limited vision condition, their mental and psychological condition will be affected as well. Thus, the behaviour of visually

impaired people will be discussed and it will be used as benchmark goal for proper outdoor space design.

## **LITERATURE REVIEW**

### **Human Behaviour**

Behaviour reveals human through action, physically connected activity, it is the interaction of human with another human or with environment (Joyce, 2005).

Tandal (2011) stated that human behaviour could be classified into two, which are:

1. Introvert behaviour, is a response of a person toward stimulus within covert action. The response or reaction toward this stimulus is still limited to caring, perception, consciousness, and the behaviour could not clearly be identified by others.
2. Extrovert behaviour, it is a response toward stimulus in form of clear crystal action or opened. The response toward stimulus is already in form of action or practice.

### **Factor That Affect Behaviour**

Strong relation between environment setting and humans, even there is active-reactive effect between them. In other words, if there is a setting change which is synchronised with activity, there will be certain effect on human behaviour. There are several variables that affect human behaviour (Setiawan, 1995), which are:

1. Space  
Most important thing from space that affects human behaviour is function and use of the space. Designing physical room has variables that affect the behaviour of its users.
2. Size and shape  
Size and shape of a room must be concerned with its function, too big or too small size of a room will affect the behaviour of its user.
3. Furniture and management  
To manage furniture placement must follow function and activity that will be executed in the room. Symmetrical management will give firm and formal touch. Meanwhile, asymmetrical placement will give dynamical and informal touch.
4. Colour  
Colour plays an important role in providing environment of the room and creates certain behaviour. In a room, choice of colour does not only give the advantage of cool or warm room, but it could also affect the quality of the room.
5. Sound, temperature, and lighting  
A high decibel sound that could penetrate a room will give negative impact. It is also worked in temperature and lighting that could affect a psychological status of someone. A room with low light condition tends to turn people into lazy and too bright condition is bad for eyes.

### **Behaviour and Architecture**

Architecture creation is invented to be used by humans. The creation of architecture is affected and affects by human behaviour as its user. The presence of architecture creation will create certain behaviour. For example, provision of vast park for public with middle to low income will shape its behaviour. They behave to follow in accordance with the presence of the park. It is how they use rest spot to sit on a long wooden chair which is provided within

the park, how they walk from A to B by following trail provided within the park. In other side, in order to make perfect of architecture design, the users will modify the design in order to meet their condition and behaviour. It is said that architecture creation follows the behaviour of its users.

### **Visually Impaired**

A visually impaired person is limited in using their sight vision and very less vision compared to other normal vision people. In order to exchange their lost vision, they must train other senses. The training makes other sense become stronger (Kompasiana.com, 5 February 2019). Blindness makes people limited to do their daily activity. It affects their social interaction ability. It is common for visually impaired people to behave certain behaviour; they even have certain style and look. Abdurachman (2013) stated that visually impaired people is identified into three classes, which is low vision (able to see with certain amount of light), blind (only able to identify dark and bright), and totally blind (total blind). Each category will demand different provision which required based on their condition. Such bright colour will somehow still able to help visually impaired people to identify objects for low vision category. Meanwhile total blind group need a certain shape of material to help them identifying the objects by using their touching sense. Kemp (1981) stated that visually impaired is one the hardest physical disability to face with. Moreover, it become worse when the disability is a result of accident, drugs misperception, or other human error whereas the person could normally see before. Limited option as result of blindness will decide certain treatment for adaptation process (Tania, 2016). Adaptation process is started with provision of disabled person that meet its character and behaviour.

Mary Kingsley (cited by Heather Mason, 1999 : 23) stated that there are four impacts by the time people lost their sight, which are; social and emotional impact, language and communication impact, cognitive impact, and impact of mobility development and orientation. The first person who feel first impact of lost sight is the person itself. Lost sight condition will bring such negative impact toward the person, and next impact will be:

#### **1) Personal impact**

Visually impaired will have direct impact to its bearer, which is loss of the vision. The condition will lead them to inability to do several daily activities. These new troubles will affect the disabled person. Such negative wild physiological condition will result in frustration state. Characteristic of a person is widely affected by frustration level. This state will lead the bearer to be emotional, introvert, and lack of confident.

#### **2) Social and emotional development impact**

The presence of visually impaired person sometimes brings negative perception among society, though negative respond is still found. Unfortunately, negative respond dominates society environment. Visually impaired person basically demands and want to have same level of participation with other normal people among community. Sometimes, people thought negatively toward these visually impaired person, such as their dependant on other normal people (unable to live by alone), have such weak characteristic, and etc. it all leads negative perception for visually impaired person.

#### **3) Language and communication impact**

A chance to have interaction is lost from visually impaired people because their ability to commence a conversation is declining along with their lost ability to see. Knowing their disability, blind people tend to choose to be quiet in public places.

#### **4) Cognitive development impact**

As a result of inability to follow and keep up with other normal people because their blindness, visually impaired people barely receive new knowledge and information during their lifespan.

5) Movement orientation and mobility impact

With lost of their vision, visually impaired person will hard to find new experience because of their lack of mobility.

Most of visually impaired people tend to close and quiet, diffident, shy, which is result of their limited vision sense. Slowly, they need to be introduced with local environment. That is why, outdoor design that consist media to fulfil their expectation and to support their mobility. It is designed to support cognitive and motoric responds of visually impaired people could be better run.

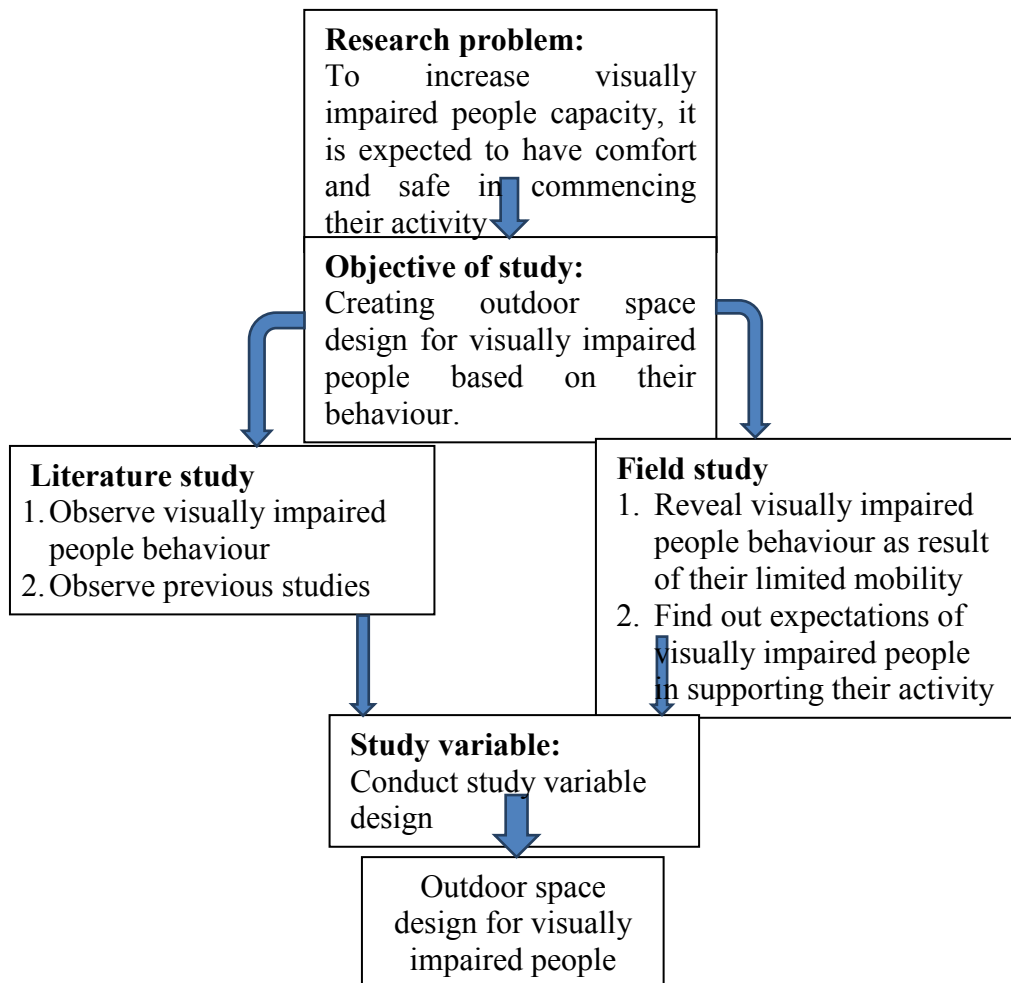
### **Previous Study**

Lestari (2012) conducted environment study of visually impaired people behaviour which is used to find design concept. The result of study is very applicable to understand the behaviour of visually impaired people. Kim (2020) had conducted the behaviour of visually impaired people through media of cell phone. Meanwhile, this study will create outdoor design which is based on the condition of characteristics and behaviours of visually impaired people. Thus, before designing the outdoor space, it is important to observe visually impaired people behaviour and become foundation in designing the outdoor space which will be mostly used by visually impaired people in order to find comfort and safety during their mobility, which is mostly an outdoor environment.

### **RESEARCH METHOD**

The method used in this research is descriptive exploratory method which is implemented through literature and field studies. The initial stage is to identify the research problem, then determine the research objectives. The next stage is to conduct literature and field studies. Literature study is conducted by studying the theory of visually impaired behaviour and studies as well as previous research. Meanwhile, the field study was commenced by observing, revealing, and directly interacting with visually impaired people, the condition of their visually impaired and the desire of the blind people to do activities. The field study was conducted at the Special Secondary School Category A (SMPLB-A) which is under the auspices of the Child With Impaired Visual Education Foundation (YPAB). In addition, it was also carried out in the field at the Technical Service Unit (UPT) of Bina Netra Social Rehabilitation, Malang. The SMPLB-A YPAB was chosen as the object of the field study because this place is an educational service area or a school for the blind, which has a fairly good infrastructure in the Surabaya area, which facilitates educational services for the visually impaired so that it is expected to provide real examples of implementing more behavioural architecture. complex and can be used as a reference in creating outdoor design for blind people. Meanwhile, UPT Bina Netra Social Rehabilitation was chosen by Malang as a place of study because the agency provides services and social rehabilitation for people with visual disabilities to increase self-esteem, self-confidence and self-esteem. Thus the social aspect is also a consideration in creating outdoor space designs for blind people. Literature studies and field studies are used to determine the design variables which are then used as references in designing outdoor spaces for blind people.

## Research Procedure Flow Chart



## RESULT AND DISCUSSION

### Architecture and Visually Impaired People Behaviour

Architecture is invented to fulfil human's expectation. As social creature, humans are always dependent to its environment that shapes them. Joyce (2005) stated that in architecture study of behaviour-environment, it is known that the study is a product of human's adaptation toward their terrestrial environment and culture, it is how human interact with environment. From many perspectives of architecture and behaviour, it is concluded that there are several principles that must be applied during behaviour based environment design, which are:

- It is able to meet the expectation of user activity with comfort, safe and fun.
- It is able to commence communication between human and environment.
- It is able to find aesthetic aspect.

From several observation conducted toward visually impaired people, there are characters and behaviours of visually impaired people as follow:

- Limited vision condition result in declining will to move, which will affect movement aspect of them.
- They prefer straight and geometric circulation.
- They walk with walking stick sway around to left or right or thumped into floor.

- d. They prefer other sense to sight sense, which are hearing, smelling, touching sense to mark an object.
- e. Visually impaired people tend to stay quiet and shy. This situation is bad for their cognitive status which will not developed well enough, because of lack of studying and socialisation.

From result of study which take place in SMPLB-A YPAB of Surabaya and Bina Netra Rehabilitation Centre of Malang, there are several points, as follow:

- i. In order to secure safety of visually impaired people while doing activity, a wide access of walk road is implemented and it must be one way round.
- ii. A linear circulation is implemented to help visually impaired people to guide them to their destination.
- iii. There must be softscape and hardscape.
- iv. There must be contrast colour for the building.
- v. There must be guide wall to help them walking to their destination.
- vi. There must be wall limiter

Next, the result of theoretical and field observation is implemented to decide variables of comfort and safe outdoor space which meet the expectation of visually impaired people within their behaviour and characteristics.

The variables are:

- a. Information clarity
- b. Ease of mobilisation
- c. Use of other sense despite vision
- d. Mobilisation safety
- e. Capacity increase.

### **Outdoor Space Design for Visually Impaired People**

The motivation to help people with visual impaired for their outdoor mobilisation is commenced by designing outdoor space which is based on their characters and behaviours.



Figure 1 : Braille Map Opening



Gambar 2 : circulation guide

Figure 1 presents the initial solution to the outdoor space that will be used by blind people, namely in the form of placing a braille map in the most strategic and easily accessible place. This braille map can help blind people to give directions to a place. So in every building complex that is used by blind people, a braille map should be installed in the most strategic part, as a form of clarity of information. Meanwhile, Figure 2 shows the need to solve a circulation path that is easy and favoured by blind people, namely in the form of a straight line (geometric shape). As far as possible, winding roads are avoided. If there is a turn, an angle of 90 degrees should be used. This will make it easier for blind people to remember directions. In addition, it is necessary to distinguish the texture of the materials used for road



Figure 3: water fountain location



Figure 4 : vegetation touch

materials. This difference in texture serves to provide direction for blind people. The difference in textures in the circulation pathways can be felt by blind people through the cane used as a walking aid. This stick is tapped on the circulation path, so that the difference in texture will be felt. And blind people will walk along a path with the same texture. This settlement is a form of ease of mobilizing.

Visually impaired people use other senses more than sight. To become familiar with a place, blind people need a marker. One that can be used as a marker is the presence of a fountain (picture 3). This fountain can be a marker for blind people through the sound it makes. Sound is captured through the sense of hearing. Several fountains can be placed in several places in one site, by selecting and distinguishing the type of sound produced. The difference in the sound generated by the fountain can be a marker for different places. For example, in the middle yard, a fountain is installed with the sound of water gurgling that is not too loud and in the back yard a fountain is installed which makes the sound of water gurgling rather loudly. This difference in voice will be remembered by blind people as well as a marker of a place. Figure 4 is a marker for blind people who are carried out through the sense of smell, namely placing flowers or plants that cause odours. Like fountains, plant placement can be done at several locations on one site by distinguishing plant scents to distinguish a place. Blind people will remember and know where they are by using plant scent markers. This is in line with the opinion of Yoshihiro (2018) which states that it is not safe for people with visual disabilities to walk alone, so clear markers are needed to recognize their space and position.

Visually impaired people also use their sense of touch to help direct circulation. Motlagh (2018) states the need for a strategy for planning the paths traversed by blind people. They walk by holding on to the railing or handrail. The handrail is installed at waist level so that it is easily accessible by blind people and is ergonomically quite comfortable to use.



Figure 5



Figure. 6

Within this technique, visually impaired people will feel comfort and guided. In figure 5, railing is placed all over pool. The rail is used not only as guidance for visually impaired people, but also to guarantee their safety while taking a walk. It is also displayed in figure 6, it will give fee of comfort and safety for them. Handrail could be exchanged with guide wall, it is part of wall which is shaped into certain pattern. This way, visually impaired people can use their touching sense through the wall as guide for them and circulation phase.



Figure. 7. Macro Communal Room



Figure.8. Micro Communal Room

Communal is important in designing outdoor space for visually impaired people. It is good to boost their confident level, decrease diffident, and shyness for visually impaired people. They must be trained, and give sometimes to interact with other stranger, to perform, have a joke, and storytelling with society. A communal room is a perfect media to do such actions. Communal room could be designed wider than usual which is displayed in figure 7 or smaller one which is displayed in figure 8. Micro communal room is aimed for a certain people and become a first step to have interaction and knowledge with other people. Meanwhile, macro communal room is usually used to have small performance. Visually impaired people could show off their existence in this room through some events that require their assistance. These series are expected to boost their confident level and create comfort stage to interact with other stranger in public space.

## **CONCLUSION**

From the explanation above, it is concluded that it is very important to observe the behaviours and characteristics of visually impaired people to design outdoor space which will become a main place for them to grow their mental state. Within these observations, a proper safe and comfort outdoor space design will be completed and meet the condition of visually impaired people while they are taking action.

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