Abstract

This paper intends to investigate the problem of installation of tactile ground surface indicator at Masjid Jamek LRT Station. The research involved a ‘walk-through’ test with 28 visual impaired passengers as research participants. The measurement counted on numbers of deviations produced by the participants throughout the test. The result shows that, the biggest contribution to the deviations was due to tactile configuration and end user’s experience. The authors conclude that, action should be taken by the authority and stakeholder accordingly, and not literally implementing other country’s guidelines as it may differ in culture.

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Keywords: Tactile; visual impaired; wayfinding; LRT station

1. Introduction

There were quite numbers of researches concentrated on human way finding over the past few years. The findings of previous researches innovate by introducing many devices to facilitate people especially those with visual impairment. In 1965, Seiichi Miyake has invented the Tactile Ground Surface Indicator as a tool of communication between visually impaired people and built environment (Mizuno et al., 2008). The device functions to help the elderly, children and tourist as well as those with visual impairment in their way-finding. Besides, the tactile enables people with visual impairment to navigate
easily and safely (Ovstedal, Lid, and Linland, 2005). According to Ovstedal et.al (2005), the tactile should also be helpful in determining the quicker way with less effort.

Previous studies agree that tactile should be provided inside a public building because the blind need it. In Malaysia, the installation of tactile blocks usually follows the Japanese style; the origin of the technology (Mizuno, T. et. al., 2008). Despite the high cost of installation, that many building has put their effort to fulfill the requirement. This includes Kelana Jaya Line Light Rail Transit (LRT) system. However, hardly any researches pay attention to check how far the technology works in the country. According to Fairuzzana & Fuziah (2012), many visual impaired passengers do not use the tactile route provided when they transverse inside the station. This has become an issue among the stakeholders since they spent a lot of money to provide such facilities and yet it was not fully used. According to Mizuno et. al, (2008) the developing countries should study on how the visual impaired traverse in the environment in order to avoid any installation error in the future. Moreover, Syazwani Abdul Kadir and Mariam Jamaludin (2012) propose to get opinions and experiences from the end users to have a better understanding of their needs in the accessibility.

Thus, the aim of this research is to have an overview about the facilities provided at the public train station. The purpose of this study is to identify the actual problems regards to the installation of tactile ground surface indicator (TGSI) at Masjid Jamek LRT Station. The study used a way finding test to obtain information from the actual visual impaired passengers regarding the problems of the device. The used of focus group help determining the critical issue regarding subject requirement. This method involved a discussion of the three components; layout, texture and colour of the device. These components were highlighted by Finkel (1994) to have provided a majority of information in the way finding of visual impaired people. In the study, we compared the way finding result of two different types of visual impaired people to get in depth understanding of how each group react towards the technology. Overall, analysis of the research focused on the relationship between the deviations performed by the different types of visual impairment and the three components tested in the way finding test. This is critical as Malaysia Standard (MS1184:2002) also required the stakeholder, designer or the building owner to look into these elements when installing the tactile.

2. The design standard

In Malaysia, the installation of tactile usually based on Malaysia Standard Code of Practice for Access of Disabled People to Public Building (MS1184:2002). The Malaysia standard referred to Australian Standard Design for Access and Mobility and British Standard Code of Practice for Access for the disabled to buildings in order to develop a guideline. According to the guidelines, the tactile should be detectable by underfoot, easy to install yet with low maintenance. Based on the standard, there are two types of guiding blocks in Malaysia. There are Dot-type blocks; (Fig. 1(a)) as a warning signal and the line-types blocks; (Fig. 1(b)) which designated to guide the visually impaired people to the correct route.

One of the major focuses, concerning tactile installation is the layout of the tactile itself. Mizuno et. al. (2008) mentioned that the tactile should be installed at safe location. This will reflect the function of tactile in which to help the visually impaired people avoid hazardous elements when they follow the track. In Malaysia Standard Code of Practice for Access of Disabled People to Public Building (MS1184:2002), they required to have at least 300mm gap between the tactile edges and the architectural elements such as doors, entrances, stairs, lifts, escalator and ramps. However, the warning tactile need to be installed 600mm away from the hazardous location. In fact, the standard highlighted that, bigger distance need for dangerous drop-off such as railway platform. Figure 2 illustrates the example of tactile layout based on the MS1184:2002.
Apart from that, the tactile must use a non-slip material and have a contrast colour with the background. Based on Japan Guideline, the original colour coding for tactile is yellow (R. Sakaguchi, 2000). In Malaysia, the block usually is in silver, yellow and grey colour. Sakaguchi (2000), however, mentioned that, there are various colours of tactile today because the designers intend to change it. According to Sakaguchi (2000), sometimes the differences in hue level contributed to colour contrast. In this case, the colour difference between the tactile and neighboring pavement is vital (R. Sakaguchi, 2000; A. Stahl, 2004). On the other hand, according to T. Mizuno (2008), some country possessed a different colour coding as an indication to various function of tactile.

3. Method

In compliance to the objective, we conducted a walk through test with visual impaired passengers as research participants. The study took place at one of the busiest light rail transit station; Masjid Jamek. It involved the main functional area where the train riders usually used when they transit at the station. According to Kandee (2001), the four main functional areas are core area, transition area, peripheral area and administrative area. The core area usually facilitates with ticketing counter, Automatic Fare Collection gate and passengers meeting point. The transition area or concourse area links the transit facilities in core areas to the peripheral area. Hence, the peripheral area is an area where passengers are queuing before boarding into train (RTD Design Guideline & Criteria, 2005). It is also referring to the platform of the station. In this paper, we investigated the participants’ behavior at two main functional
areas; transition area and peripheral area. It was because these were the only areas inside the station that facilitated with the tactile. In total, there were 28 visually impaired passengers were recruited to participate in the walk through test. The participants were among those who had experience and had no experience being at the station. However, all of them were familiar with the light rail transit system. The research acquired the participants to be physically fit in terms of mobility even though they have a visual impairment. Prior to a walkthrough test, the researcher gave a short brief on the methodology, objectives and the significance of the project. In the briefing, the researcher also highlighted about safety consideration of the participants.

3.1. Limitation of the research

At the beginning, it was quite challenging to get the visual impaired passengers to involve in the research. This is because the sample is rare and is limited to a small subgroup. Besides, according to one of the officer of Malaysia Association of the Blind who is also a blind, the visual impaired people might not responsive to unfamiliar people. Thus, this has been approved by the researcher’s few trials of direct approach on site for sampling purposed. Based on the trials, it was difficult to get the cooperation from the visual impaired people. Thus, the research had collaborated with the Malaysia Association for the Blind (MAB) to facilitate the sampling number. In this case, the research found that although they suffered impairment of sight, but they still feel safe to pursue the study.

At the same time, the research also has to commit with the limited time frame stated in the work permit given by the RapidKL.

3.2. Walkthrough test

A walkthrough test comprises of two trials for each person. The first trials were a guided tour by the researcher to the pre-selected route. At this moment, the researcher introduced the participants with the checkpoints of the route. The checkpoint started from the arriving platform from Gombak and ended at the departure platform to Gombak. They have to remember the checkpoints for the next trial. The second trial required them to lead the researcher. The researcher will only intervene in the test if there were safety factors involved. Apart from that, each participant needs to give comment and describe the problem regarding the journey by using a tape recorder. Besides, the researcher used video recorder to record the participant’s behaviour during the walkthrough test. The participants considered performed an error if they make any changing of walking direction (turn left or right) aside from the mentioned checkpoints in the trial. The researcher charted the error or place of error made by the participants as a deviation point (Fig. 3 and Fig. 4).

Fig. 3. Deviations points performed by participants at Platform Level
4. Result

Masjid Jamek LRT station is one of the busiest light rail transit station in Klang Valley. It is a multilevel building. It is also an intersection station where passengers can transit from the Kelana Jaya Line to the Ampang Line through an underground tunnel. Based on the general site observation, the Tactile Ground Surface Indicator or guidance block was not consistently installed at the station. The installation of the TGSI only focused on platform area up to the concourse level. Hence at ground level, they only used the different sizes of tiles as the guidance route. In order to comprehend with the main objective of the paper, therefore, the discussion concentrated on the walkthrough test at the TGSI route only.

4.1. Difficulties at checkpoints

Based on the observation, there were some participants who neglect to follow the designated route. In this study, if the participants choose the alternative route, we considered that as an error or deviations in the walkthrough test. Table 1 summarized the percentage of deviations made by the participants during walkthrough test. The platform level consists of checkpoints C7, C8a, C8b, C8c and C13. At Concourse level, the participants have to go through 3 checkpoints; C9a, C9b and C9c. The C8a(r), C8b(r), and
C8c(r) were the checkpoints at Concourse Level where the participants need to go through during their return journey.

Table 1. Total percentage of deviations performed by participants during walkthrough test

<table>
<thead>
<tr>
<th>Checkpoint</th>
<th>Totally Blind (n=15)</th>
<th>Low Vision (n=13)</th>
<th>Percentage of deviations per checkpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>C7 Platform to Kelana Jaya</td>
<td>0%</td>
<td>23%</td>
<td>11%</td>
</tr>
<tr>
<td>C8a Staircase</td>
<td>0%</td>
<td>15%</td>
<td>7%</td>
</tr>
<tr>
<td>C8b Escalator</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>C8c Elevator</td>
<td>67%</td>
<td>39%</td>
<td>54%</td>
</tr>
<tr>
<td>C9a Staircase</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>C9b Escalator</td>
<td>0%</td>
<td>31%</td>
<td>14%</td>
</tr>
<tr>
<td>C9c Elevator</td>
<td>67%</td>
<td>46%</td>
<td>71%</td>
</tr>
<tr>
<td>C8a(r) Staircase</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>C8b(r) Escalator</td>
<td>0%</td>
<td>39%</td>
<td>21%</td>
</tr>
<tr>
<td>C8c(r) Elevator</td>
<td>53%</td>
<td>39%</td>
<td>46%</td>
</tr>
<tr>
<td>C13 Platform to Gombak</td>
<td>7%</td>
<td>46%</td>
<td>25%</td>
</tr>
<tr>
<td>Total Percentage of deviations based on category</td>
<td>13.1%</td>
<td>13.9%</td>
<td></td>
</tr>
</tbody>
</table>

Based on the result, checkpoint C9c Elevator received the highest percentage of deviations per checkpoint with 71% in total. The total percentage represented the total result of the walk through test for both categories. This followed by checkpoint C8c Elevator and C8c(r) Elevator with 54% and 46% respectively. More than half of blind participants performed deviations at checkpoint C9c Elevator. Most of the blind people were unaware about the 90 degree path on their left or right hand side. Therefore, they confused and missed it (Figure 5). This has contributed them to an error. They mentioned that, the installation of warning blocks was too small. For them, it was not clearly detectable by underfoot or white cane.
Fig. 5. Participants missed the turned at the 90 degree corner of tactile track

Nevertheless, the low vision performed 46% deviations at C9c Elevator. This is because they intended to use other route or shortcut instead of following the designated tactile route. A similar problem happened at checkpoint C7 with 11%, C8a with 7% and C9b with 14% of the total percentage of deviation per checkpoint. The low vision participants commented that, with their limited eyesight, they still managed to find an alternative route. According to them, the alternative route has less in length compared to tactile route. Thus, this was main contribution to the high total percentage of deviations performed by low vision. In the test, the total percentage of deviations for low vision category is higher than blind category. The difference is 0.9% in total. On the other hand, participants with low vision also confused with the colour of the tactile and the floor pattern. Based on the observation, the colour used for the floor pattern is similar to the grey colour tactile (Fig. 6(a)). This has caused them to commit an error during the walk through test. However the problems only affected those with low vision. Many participants performed an error at the connecting tactile route between the two platforms. According to the participants, the warning tactile at the junction was not clearly detectable by underfoot (Fig. 6(b)). Therefore, they failed to notice the junction. They also do not agree with the position of the tactile route that connects the two platforms. Based on the observation, the installation of connecting tactile was underneath staircase and escalator. For them, it is not appropriate to install the tactile at this location because it may cause injury. They prefer to have it at the centre of platform.

Fig. 6. (a) Both tactile track and floor pattern in grey colour; (b) The connecting tactile route where participants usually perform error.
4.2. Analysis of voice transcription

Both categories agreed that the configuration of designated tactile inside the station is confusing. They commented that, there were many 90 degree corners on the tactile route. For them, such corners had caused confusion when they used the route.

“It was confusing when there is a sudden turn. There is no connection between one tactile track to another.”

(Narrated by Chan Chen)

However, majority of low vision participants decided not to follow the designated tactile route. They rely on their limited eyesight. They commented that, the designated tactile route was longer and complicated. Besides, they also mentioned about the public who helps them usually do not use that route. They use shortcut.

“I could still see the landmark with my limited eyesight. I chose that route because it was easy, faster, and it is straight to the checkpoint. If I follow the tactile route, it further. It also has too many corners.”

(Narrated by Huraizah)

Apart from that, most of the participants agreed to have tactile at open space area. Though, according to them, the installation of TGSI does not particularly solving their way-finding problem. They do not know where the tactile leading to is. That was part of the reason why they performed an error during the test.

“The fact is that you have the tactile to lead you to somewhere. It is better than nothing...It is not solving the wayfinding problem even though we follow the tactile. We will not know the tactile will take us to where until we go through first. Otherwise, we have to learn it through experience. First, we have to follow the tiles. We will walk through until we touch the wall. After we found the wall, only then we realise that, the tactile lead us the wall.”

(Narrated by Chan Chen)

“Even though, I did follow the tactile, but I still have problem to choose whether I need to go to the right or to left. I found that some of the tactile routes have suddenly stopped. I’m confused.”

(Narrated by Saleha)

Most participants highlighted that the tactile route provided is not a user friendly. They commented that, the tactile route does not lead them to other vertical circulation except elevator. Majority of them required to have an alternative way such as tactile route to the escalator or staircase. According to them, it is most significant when the elevator is breakdown. Overall, participants were glad to have an opportunity to express their opinion about the existing installation of tactile. They also mentioned the vital point of having a research with the visual impaired person as the respondents is because they are the end user of the products.

5. Discussion

Based on the research, there are two main issues related to usability of tactile; installation error and inconsistent adaptation of the standard requirement in the design. The authority should seriously put an effort towards it. The continuous research without further action by the authority and stakeholder means nothing to the end users.

Apart from that, in this paper, we would like to emphasize on the significant of understanding the end users need before designing the tactile route. For example, based on Malaysian Standard Code of Practice: MS1184:2002, the corner of tactile is in 90 degree position (Figure 2). However, most participants argued about this arrangement. In this case, we found out that the 90 degree corner gave a lot of trouble to the visual impaired people. Based on their walking behavior, most of them will gradually
make a curve turn shape instead of 90 degree angle at the corner. In fact, from the plan (Figure 3(a)), we found that the deviations made at the curve shape corner are less than at the 90 degree corner. Therefore, the participants suggested having a smooth bend at the corner as the warning signal of changing direction rather than 90 degree turn. Otherwise, they proposed having more warning blocks at the corner in order for them to detect the signal of changing direction. This proposal matched with the Japanese Guideline. According to the Japanese Guidelines to Improve Barrier-Free Public Transport Passengers Facilities, 2001, there are differences in terms of tactile arrangement based on their size and the location of installation. For instance, if we are using the 30cm x 30cm, tactile, therefore, we need to have more warning tactile to indicate branches or bend of tactile route.

Therefore, the authors suggest the authority to look into this option as it is the feedback of the end user. If not, the possibility of the visual impaired people to face the similar problem with tactile configuration is probably high. Besides, the layout of the tactile also plays an essential role to determine whether it is usable and practicable in the real environment. The location of installation and the length of tactile should be considered first before installation begins and not as the second thought solution. This is to avoid additional cost by the improvement work.

Other than layout and texture, colour of the tactile is also significant in the wayfinding process (Finkel, 1999, Carreon, 2000). In this research, many low vision participants mentioned about this issue. According to Sakaguchi, 2000, the contrast between the tactile and neighboring pavement is useful for the low vision people. This is because they walk by recognizing the colour difference (Sakaguchi, 2000). Therefore, in this case, the designer have to be sensitive when choosing the floor finishes. For instance, in Figure 5(a), even though, there is texture on tactile, but, the low vision participants still get confused. This is because the colour and the size of tactile are similar to the floor pattern. They misunderstood the tactile with the floor pattern. Therefore, this matter has caused them to lose direction while moving in the building. There are varies colours of tactile in the market. In Malaysia, there are yellow, silver and grey colours of tactile. However, it is more significant to have a consistent colour for tactile. This is because, according to the visual impaired people, they always learn from experience. Therefore, they will easily get confused if there are difference colours of tactile at difference location.

6. Conclusion

The Tactile Ground Surface Indicator (TGSI) route at Masjid Jamek LRT Station was not fully utilized by the visually impaired passenger due to several issues. Based on the research, the three elements which are layout, texture and colours, influences the effectiveness of tactile installation. For instance, many passengers found that the tactile route was too long that they avoid using it. Therefore, we suggest the authority to take action based on the comment given by the end user and not literally copy the other country’s guidelines as the culture may differ (Mizuno et al, 2008). For further research, it is good to study whether culture would influence the way of visual impaired people navigate around built environment. This could help to determine most effective tactile configuration for each region. Besides, the research regarding emergency exit route for visual impaired passengers inside the train station is also desirable. In fact, the participants also highlighted this issue during the interview session. This is significant because in the event of emergency, people usually panic and run for themselves and this minority group might be ignored.

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