

# The Interior of Medium-Scale Business Tiara Handicraft in Surabaya with Accessible Design Principle for Mentally and Physically Disabled Employees

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**Keywords:** Disability, Accessible Design, Human Resources, New Normal, Medium-Scale Business.


**Abstract:** Work is an essential activity for all living human, especially those with disabilities. The lack of adequate facilities to support disabled employees in the medium-scale business Tiara Handicraft in Surabaya causes the inefficiency and increased dependency of said employees. A breakthrough, followed by a set blueprint, of the interior design of Tiara Handicraft aims to create an *accessible design* that takes into account the anthropometry of Indonesian citizens, as well as the safety for all its employees. All of these are done in order to provide ease of access for disabled employees of Tiara Handicraft when utilizing prevalent facilities so they can increase their productivity and improve the quality of the end product. The usage of *Design Thinking: Empathize, Define, Ideate, Prototype, and Test* method assists in comprehending the problem systematically, thoroughly, and subsequently discovers conceptualized, fathomable, and accurate solutions. The result of this design is a conceptual idea. The principle of *accessible design* will also be implemented on the styling process of a certain area within Tiara Handicraft. Hopefully, the idea, design principle, and design outcome could stand as a model for other facilities to improve the productivity of disabled persons, and consequently improve the quality of their lives.


## 1 INTRODUCTION


According to Westwood (2008), in the Socio-Cultural Context, work activities are a moral obligation for each individual to contribute to the family welfare. Work is an activity that is important for everyone, including for those who have disabilities. Disability is a function or condition that has interference with the standardized condition of individuals or groups (World, 2019). As stated in Article 8 of the Indonesian Law 2016, equality of right and opportunity towards disabled people should be enforced and upheld in any situations, including in the working environment. According to International Labor Organization (ILO, 2017) as many as 15% of Indonesia's population are disabled people, so it needs *quite* an effort to equalize the rights of disabled workers in Indonesia to live independently by working (ILO, 2017). Moreover, according to data

from the International Labor Organization, people with disabilities are very vulnerable to poverty in every country due to the limitations job vacancy that matches their abilities. In other words, ignoring disabled people will affect the economic activities and growth in a country.

To help and to improve the welfare of the disable can be done by providing a place and jobs in accordance with their abilities and must be supported by prevalent facilities. Tiara Handicraft is one of the Medium-Scale Business in Surabaya that specifically employs disabled workers. This business, which is located on Sidosermo Indah II Street No. 5, South Surabaya, was established in 1995 with an aim to empower and to provide a job and learning facilities for the disable. There are approximately 35 workers with different kinds of disabilities, such as hearing-impairment (*tunarungu*), speech-impairment (*tunawicara*), physically disabled (*tunadaksa*), or mentally disabled (*tunagrahita*). Tiara Handicraft

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UMKM employees are dominated by hearing and speech impairment, so that the main problem is difficulties in receiving and conveying information to customers. The type of hearing-impaired that most Tiara Handicraft employees have is deaf. Deafness is a condition in which people are completely unable to hear or their hearing system is severely damaged (Somantri & Herlina, 2006). Accordingly, it needs signage and wayfinding to optimize the communication process. In addition, the types of physical disabilities or *tunadaksa* owned by the employees are included in the category of "inviabile" (*cacat dari lahir*), namely physical limitations in the form of physical damage or abnormalities innate (Syafi'ie, 2014). With their vision and mission, which is to provide a better life for the disable, Tiara Handicraft UMKM gives them an opportunity to work in order to improve the quality of the workers' life. However, the lack of providing adequate facilities causes the inefficiency and increased dependency of the said disabled employees. The main problem experienced by the Medium-Scale Business Tiara Handicraft store is related to the lack of supporting facilities, such as unfriendly pathway, especially those who are physically disabled (*tunadaksa*) due to a height difference on the floor and also steep mezzanine access. Other problems that occur came from the shelving system (for the placement of raw materials, ready-to-sell raw materials, and ready-to-sell products) and layout that are disorderly and inefficient for disabled people, especially for mentally disabled (*tunagrahita*) employees. In addition, there is a lack of facilities that could help the blind people (*tunanetra*) in carrying out activities in the store such as lack of signage and wayfinding.

Accessible design is a design process where the needs of the disable are specifically considered (University of Washington, 2021). One of the accessible design characteristics is that the products and facilities created can be accessed independently by various types of limitations, such as physical and mental limitations (Center, n.d.). As explained by (Winters & Story, 2007), an accessible design is a design that can fulfill certain legal mandates, guidelines, or code requirements to provide accessibility for individuals with disabilities. Therefore, it requires development and innovation design at the Medium-scale Business Tiara Handicraft store by using the accessible principle which is implemented through the concept of "MENARIC". "MENARIC" stands for Marketable, Efficient, New Normal, Accessible Design, Relationship, and Eco-Design. However, in Indonesian, *menaric* or *menarik* has the meaning of

attractive. The advantage of this concept is to emphasize the human principle of a design so that it can be easier for disabled people to access the facility. Moreover, with the limited abilities of the disable, they can work more optimally and efficiently.

## 2 DESIGN THINKING METHODS

This project uses the Design Thinking method popularized by David Kelley and Tim Brown as the founders of IDEO in 2011. This method is used to produce effective solutions based on the needs and problems experienced directly by users. Design Thinking is a problem-solving method that is suitable for design and architectural design (Suprobo, 2012).

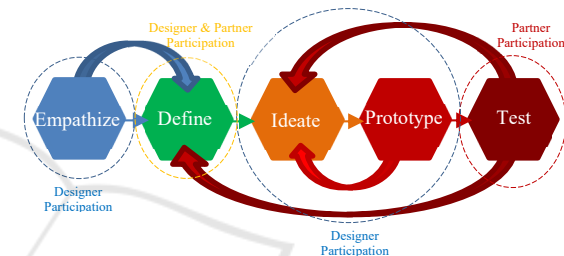


Figure 1: Five steps in design thinking and the participation between designers and Tiara Handicraft's owner (Source: adapted from Goldman et al., 2009).

The Design Thinking method collaborates with accessible design principles that prioritize the ease of users, both for workers and visitors in their activities. However, not only to facilitate or increase worker's productivity while working but also to ensure security for all users.

During the implementation, the research was conducted with hybrid method, partly using offline and online methods because of the Covid-19 pandemic. However, this study and design processes are still carried out optimally and following the original purposes of mastering commercial space design skills, understanding the commercial space theory, and understanding the design thinking theory. In the design process, the design thinking method was used which was adapted from the Stanford School of Design (Both, 2010) which consisted of 5 steps (Figure 1). In the early phase, such as Empathize, direct and offline observations were made to the Medium-Scale Business Tiara Handicraft store to understand the users, space, and problems that were felt and experienced (Karlen, 2009). Starting with the interview process with the owner shown in Figure 2 using the interview for empathy method to find out the background of the Tiara Handicraft, and with the

disabled employees of the Medium-scale Business Tiara Handicraft through the extreme user interview method to find out one's emotions, motivations, and thoughts to determine the innovation that will be created for disabled people (Both, 2010) as well as observing their daily activities.



Figure 2: Interview for empathy and interview extreme user process (Source: Geraldine, 2020).

In the second phase, Define, the data that was collected from the interviewees will be processed together in groups by using the Online Focus Group Discussion method to discuss and solve the problems using online tools as an adaptation of traditional methods (Nyumba, Wilson, Derrick, & Mukherjee, 2018). During the discussion process, using the site analysis method (White, 1983), the calculation of space requirements (New Mexico General Services Department Property Control Division, 2000), bubble diagram (Karlen, 2009), and the problems are classified using 5 steps in the affinity diagram method which produces a problem statement and programmatic concept which will be resolved spatially in the Ideate phase (Peña & Parshall, 2001). In this phase, the design processes are done in completely virtual.

The third phase is Ideate. This phase is for expressing the ideas obtained by looking at the potential of the site as well as the conclusions that have been generated from the previous method, such as the affinity diagram method. The initial process of pouring out the ideas is done by designing concepts using the mind map method or concept mapping, which is a method in research that helps the process of understanding and clarifying concepts (Hu & Wu, 2012). Before going to the digital 3D modeling step, students put out the idea as much as possible using manual sketches or freehand sketches method that allow students to generate ideas easily (Dorta, 2007) then the individual alternative sketch results of Medium-scale Business Tiara Handicraft store are discussed together with tutors to find out the strengths and weaknesses of each idea. The design that is the most optimal and ideal will be chosen.

The fourth phase is Prototype. There are two ways to prototyping the design visualizing the idea and seeing the atmosphere of the store: using mockups with 1:50 scale and using digital 3D modeling with the real scale. Prototyping is a very important step in order to make the design looks-realistic. The prototype has been developed by constructing, producing, and perfecting the design before deciding the final prototype (Vetterli, Hoffmann, Brenner, Eppler, & Uebernickel, 2012). The next process is implementing the selected design; this is commonly known as the styling process in one corner of the Tiara Handicraft store by following the principle of accessible design.

The final phase in this design thinking method is the Test. The use of the Test phase is the most powerful and effective phase when it is applied as part of the sustainable development process product (Figure 3). At this phase, the final design results of the Medium-Scale Business Tiara Handicraft store are evaluated using three tests, namely exploratory (or formative), assessment (or summative), and validation (or verification) which were done together in a group (Rubin & Chisnell, 2011). The results of the Prototype phase in the form of Medium-Scale Business Tiara Handicraft store were then tested with the owner to ensure its functionality for the direct user (testimonial).

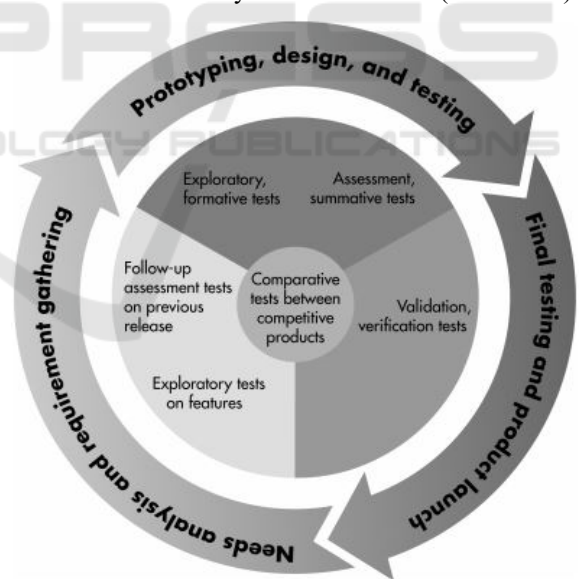


Figure 3: Test process (Source: Rubin & Chisnell, 2011).

### 3 RESULTS AND DISCUSSION

The Medium-Scale Business Tiara Handicraft has several types of disabled employees that have brought up complex obstacles. There are eight types of disabilities recognized by The International

Classification of Functioning, Disability, and Health (ICF), including mobility or physical disabilities, spinal disabilities, brain or mental disabilities, hearing disabilities, cognitive impairments, psychological disorders, and invisible disorders (World, 2019). At the Empathize phase, interviews were conducted with the owner and the disabled employees. From the data collected, the number of Tiara Handicraft's employees were as many as 35, of which the types of their disabilities vary from hearing-impaired (*tunarungu*), speech-impaired (*tunawicara*), physically disabled (*tunadaksa*), to mentally disabled (*tunagrahita*). Therefore, Tiara Handicraft faces several types of disabilities that were recognized by The ICF.

The problem of inadequate facilities for the disabled, especially disabled employees in the Tiara Handicraft store, was caused by the building initial function as a residential purpose; therefore, the facilities in the building were not designed for disabled people. As shown in Figure 4, the results of field observations shown that there is a stair with 14 centimeter height difference on the floor, and made it difficult for physically disabled people to access the store entrance. In addition, there is no signage as a guide for customers, so employees with hearing and speech-impaired need more effort to explain the product types to the customers.

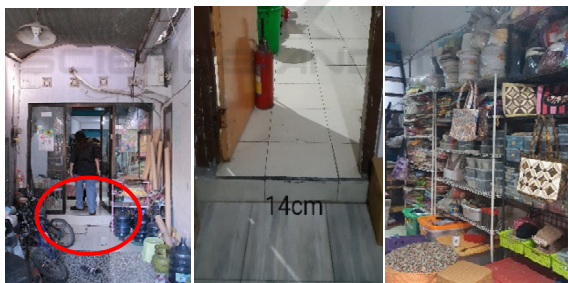


Figure 4: The inadequate facilities at Tiara Handicraft store.

After collecting the information from the Tiara Handicraft's owners and employees through the Observation method, the data will then be processed together in a group using the Online Focus Group Discussion method (Nyumba et al., 2018). The first process is to analyze the existing conditions of the Tiara Handicraft store using the site analysis method. This process produces an analysis of lighting, ventilation, and noise sources. Facing the north, the building of Tiara Handicraft store gets natural lighting from the sun without conducting heat, and also the atmosphere is quiet because is located in a residential area which is far from noise sources,

especially from the streets. However, the site does not get an optimal natural air circulation.

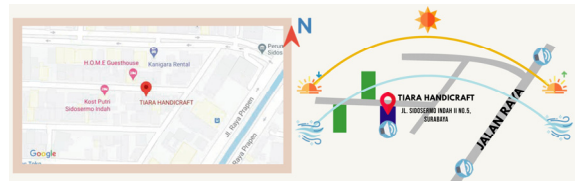


Figure 5: Site analysis of the Tiara Handicraft store.

The step is then followed by the process of determining the space relationship to analyze the Tiara Handicraft store air circulation flow. This process uses the bubble diagram method (Karlen, 2009) to make it easier to classify the space functions and determining the optimal circulation flow for mentally disabled employees. This process also produces several alternative layouts which then will be developed in the next phase (Figure 6).

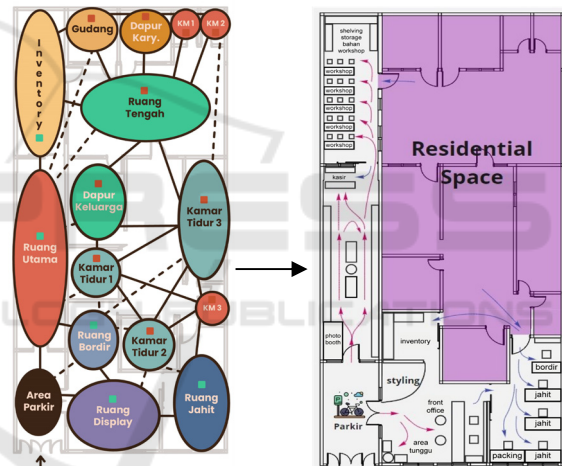


Figure 6: Bubble diagram method and selected alternative of circulation layout.

The process of determining the final design and the goal, uses the Affinity Diagram method which was done by conducting open discussion with the group members to propose an idea as a problem-solution for the existing problems. Normally, in the offline situation, this process uses sticky notes as a tool to make it easier for students to identify Facts, Problems, Needs, Goals, Concepts from the design object. However, due to the pandemic situation, this method is carried out by using online applications, such as Miro.com and Google Sheet (Figure 7). Although, the process was conducted virtually, the results remain structured and optimal. This stage produces a problem statement which will be solved

with a programmatic concept or general concept (Table 1, 2, 3, 4).

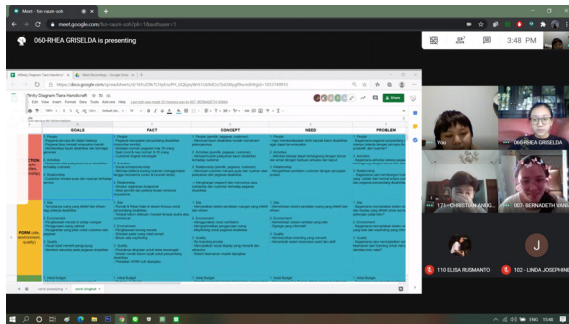


Figure 7: Online Focus Group Discussion.

Table 1: Affinity diagram – function table.

	FUNCTION (people, activities, relationship)
Goals	1. People - To make disabled employees be more confident in their work - To make disabled employees independent entrepreneurs - To facilitate disabled people from various generations
	2. Activities - To help disabled people to be able to serve customers more easily
	3. Relationship - To make customers feel satisfied and comfortable with the service
Fact	1. People - Most employees are people with disabilities (majority mentally disabled employees) - Employees max is 35 people - Middle-level customers
	2. Activities - Social entrepreneurship - Uncomfortable work activities (using steep mezzanine access & floor slopes)
	3. Relationship - Functional organizational structure - There is a symbiotic mutualism between owners and workers
Concept	1. People (owners, employees, customers) - Helps disabled employees so it will be easier to understand their work
	2. Activities (owners, employees, customers) - Helps disabled people to be able to serve customers easily
	3. Relationship (owner, employee, customer) - Make customers feel satisfied and comfortable with the services of disabled employees

Need	1. People - Empower more disabled people to become entrepreneurs
	2. Activities - Work activities occur smoothly and safely in the circulation and layout
	3. Relationship - Impress customers with the product presentation
Problem	1. People - How are employees with disabilities able to work confidently, productively, and comfortably?
	2. Activities - How can employees' work activities run smoothly and safely?
	3. Relationship - How to build solid and respectful relationships between customers and disabled employees?

Table 2: Affinity diagram – form table.

	FORM (site, environment, quality)
Goals	1. Site - Creating an effective and efficient spaces for disabled employees
	2. Environment - Even air circulation in every room - Optimal space usage - Clear directions for customers and employees
	3. Quality - Visual retail attracts visitors - Provide securities to employees with disabilities
Fact	1. Site - The space was not specifically designed for disabled people - The place was not designed to be a business or commercial space
	2. Environment - Uneven air circulation - A narrow circulation in retail space - There is no wayfinding to be found
	3. Quality - The product is aimed for the middle class - Space design was not suitable for disabled people - The fire extinguisher is difficult to reach
Concept	1. Site - Creating an effective and efficient space arrangement system
	2. Environment - Uses cross ventilation - Optimizes space usage - Provides wayfinding for disabled people

Table 2: Affinity diagram – form table (cont.).

	FORM (site, environment, quality)
	3. Quality - Product re-branding - Creating an attractive visual display - Easy to reach fire security systems
Need	1. Site - Requires an effective and efficient spatial planning system
	2. Environment - Requires a good ventilation system - Requires an informative signage
	3. Quality - Requires an attractive branding - Adds passive and active security system
Problem	1. Site - How to create an effective storage and display system to ease the work at store?
	2. Environment - How to create a good ventilation system and informative wayfinding?
	3. Quality - How to improve fire security system in the building? - How to re-brand the store to strengthen the identity?

Table 3: Affinity diagram – economy table.

	ECONOMY (initial budget, operating cost, life cycle cost)
Goals	1. Initial Budget Saving on construction & maintenance costs
	2. Operating Cost Creating high quality goods with economical budget
	3. Life Cycle Cost Maximum income and meets the needs of employees and shop owners
Fact	1. Initial Budget Budget ± 3-7jt / m <sup>2</sup>
	2. Operating Cost - Electricity costs for production work - Electricity costs for lighting and active ventilation systems
	3. Life Cycle Cost Never do any maintenances
Concept	1. Initial Budget Choosing strong and durable materials, but still economical
	2. Operating Cost Operating expenses should be in balance with income
	3. Life Cycle Cost

	Make design changes annually
Need	1. Initial Budget Implementing Eco-Design to save costs and energy
	2. Operating Cost Using and selecting economical production equipment
	3. Life Cycle Cost Requires low maintenance material
Problem	1. Initial Budget How to save on interior design costs that apply eco-design?
	2. Operating Cost How to reduce energy in the production process?
	3. Life Cycle Cost How to reduce shop maintenance costs?

Table 4: Affinity diagram – time table.

	TIME (past, present, future)
Goals	Creating up to date, flexible, and study designs
Fact	- The business was founded in 1995 (25 years) but the shop was built in 2005 (15 years) - The spatial design is not up to date
Concept	Create and use durable furniture and materials
Need	Requires a material that has a long life-span so that it can be used for a long period of time (max. 10 years)
Problem	- How to create an up to date design concept? - How to arrange a maintenance schedule without disrupting store operations?

The next phase is the Ideate, a general concept that is formed with the group to determine the design boundaries that will be applied to individual concepts and design results. The mind mapping concept method was used and yields an individual concept, namely "MENARIC. "MENARIC" stands for Marketable, Efficient, New Normal, Accessible Design, Relationship, and Eco-Design. The concept of "MENARIC" emphasizes the principle of humanity by using accessible design as the most important or dominant principle in every aspect of the design. In the initial stage of concept application, ideas can be expressed and visualized as much as possible through freehand sketch methods so that many design alternatives are able to be created and be evaluated before continuing to the 3D digital modeling process.

Concept

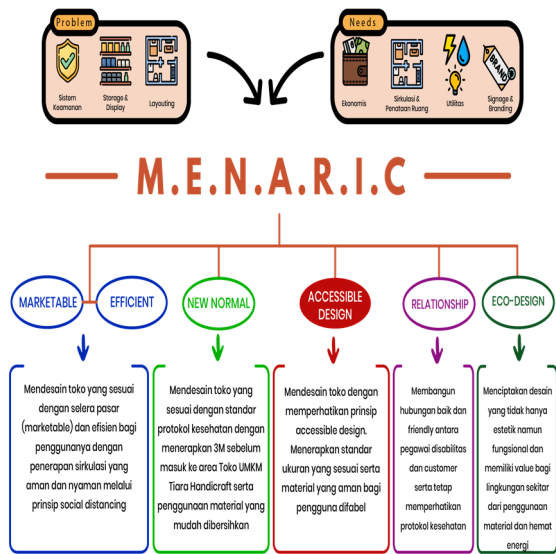


Figure 9: Maquette study.

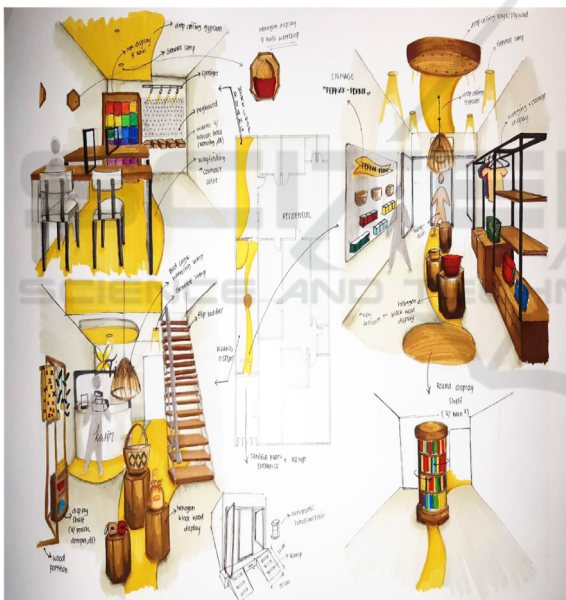


Figure 8: The concept and free hand sketch.

The selected sketch results are then visualized in 3D form as the Prototype phase. The initial prototype stage uses the maquette study method (Figure 9) with a scale of 1:50 to provide a semi-realistic design which is then evaluated by the tutor. The next method is to create a digital 3D modeling which produces the final design. The final design is presented in the form of store layout and a presentation drawing or rendering that shows accessible design facilities at the Tiara Handicraft store.

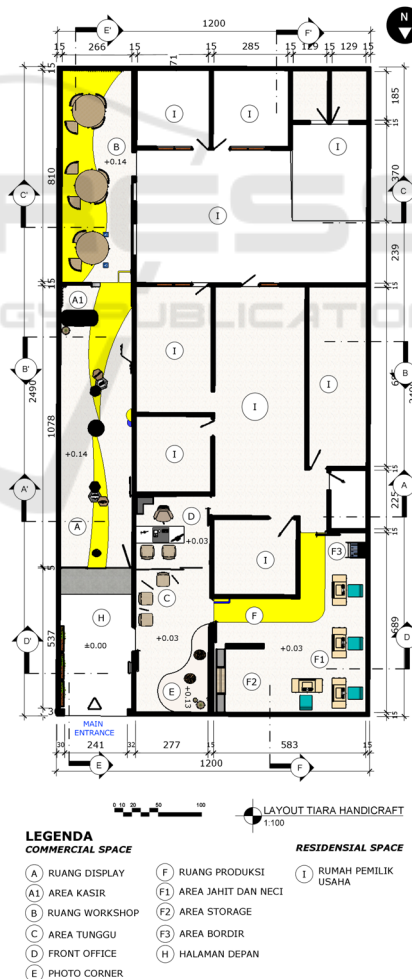


Figure 10: Final layout.

The facilities designed using the accessible design principle including the addition of a ramp, a grab bar, and disabled friendly door types in the entrance area; several construction and stairs types changes; pathway sizes changes in the mezzanine area; adds systematical shelving and signage in the store area, adds several way findings, and also pays attention to the materials used so that it can be use safely for disabled people, especially the employees. These facilities have been followed the Indonesian anthropometric standards and the Regulation of the Minister of People's Works Republic Indonesia number 14 of 2017 concerning building facilities requirements (Kementerian Pekerjaan Umum dan Perumahan Rakyat, 2017).

A ramp was added to the shop entrance access area due to a height difference of 14 centimeters. Following the Regulation of the Minister of Works Republic Indonesia, the minimum degree for the ramp is 6 degrees.

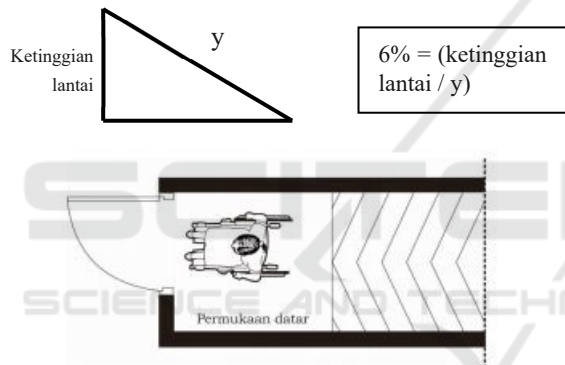


Figure 11: Ramp standard (Source: Peraturan Menteri Pekerjaan Umum Dan Perumahan Rakyat Tentang Persyaratan Kemudahan Bangunan Gedung, 2017).

Thus, the ramp calculation is illustrated in Figure 12 using rough concrete material so that users do not slip when accessing the ramp.

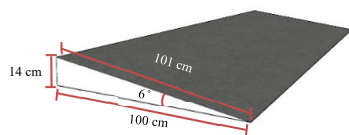


Figure 12: Ramp.

Following the Regulation of the Minister of Work of the Republic of Indonesia, the standard door to be used is a one-way swing door with a minimum width of 92 centimeters. Thus, the design uses a one-way swing door, which opens inward to make it more wheelchair-friendly with 100 centimeters wide.

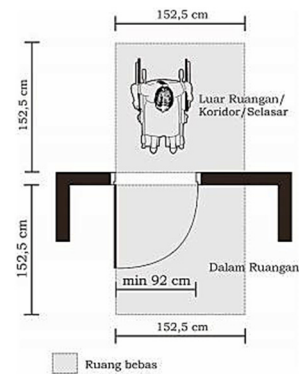


Figure 12: Door standard (Source: Peraturan Menteri Pekerjaan Umum Dan Perumahan Rakyat Tentang Persyaratan Kemudahan Bangunan Gedung, 2017).



Figure 13: Main entrance.

Adding the grab bar at the entrance area will make it easier for wheelchair users and disabled people to independently ride, access the ramp, and enter the shop area. The height of the grab bar to the ramp is 83 centimeter. The minimum height of the ramp to the grab bar is 83.8 centimeters and the maximum height is 86.4 centimeters (Panero & Zelnik, 1979).

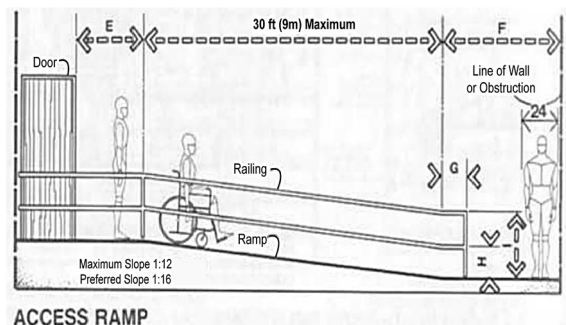


Figure 14: Standard height of the grab bar (Source: Panero & Zelnik, 1979).





Figure 15: Grab bar at the main entrance.

The store area of Tiara Handicraft has a long and narrow layout, so using folding stairs that can be bent and opened as needed is the best solution to apply. Folding stairs have been designed according to the size of the construction following those that are ideal. On the stairs, there are railings for the user safety. Following the Regulation of the Minister of Public Works Republic Indonesia, the maximum handrail height is 80 centimeters, the width for the footing is 30 centimeters wide, and the distance between the steps is 15-18 centimeters (Figures 17 & 18).



Figure 16: Folded and unfolded stairs.

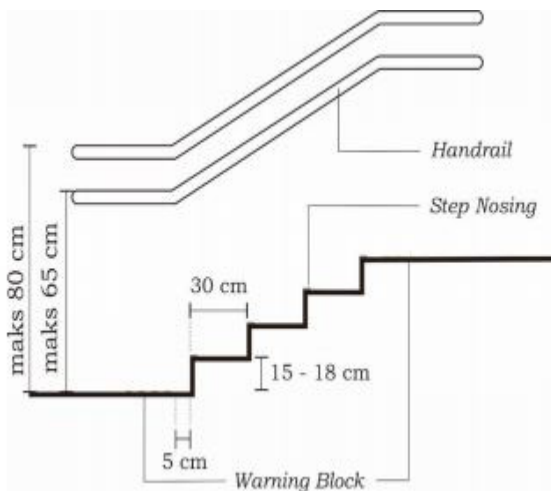


Figure 17: The standard size of stairs (Source: Peraturan Menteri Pekerjaan Umum Dan Perumahan Rakyat Tentang Persyaratan Kemudahan Bangunan Gedung, 2017).

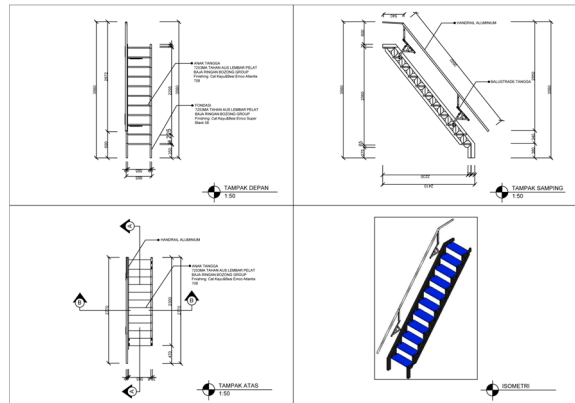


Figure 18: The detail construction of folding stairs.

Initially, the mezzanine area, which was used as storage, has an access width of 63 centimeters. According to Panero and Zelnik (1979), the minimum standard is 61 centimeters. The access is then made wider to 74 centimeters to make the users, especially disabled employees, feel more secure when accessing the mezzanine.

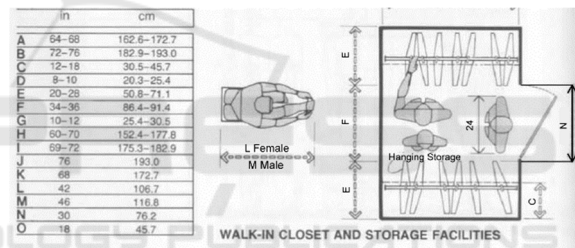


Figure 19: The Standard Width of Storage Access (Source: Panero and Zelnik 1979).



Figure 20: Mezzanine access.

Following the mentally disabled characteristics, they can be taught to do simply and regularly tasks because it is difficult for them to think in disorderly way (Munzayanah, 2000). A rhythmic, systematic, and informative shelving system was created in Tiara Handicraft store area to make it easier for mentally

disabled employees to work, such as to arrange goods and stocks. In addition, with the presence of signage on display racks, customers be more freely in choosing products and make it easier for hearing and speech-impaired employees to provide information.



Figure 21: Shelving system with signage facilities.

Creating wayfinding and signage facilities to make it easier for customers and mentally disabled employees to find rooms in Tiara Handicraft store. The wayfinding was integrated on the floor using yellow epoxy and terrazzo materials that are friendly for the disable and easy to clean. In addition, adding identification signage (Nabila & Sarihati, 2016) on the floors and walls of the workshop room, front office room, production room, and waiting room. On the floor of the workshop room, there is a signage (Figure 22) to indicate the area for wheelchair users. It uses the international standard signage symbol according to the Americans with Disabilities Act (ADA) standard for accessibility (Department of Justice, 2010).

703.7.2.1 International Symbol of Accessibility. The International Symbol of Accessibility shall comply with Figure 703.7.2.1.



Figure 22: International symbol of accessibility (Source: Department of Justice (2010)).



Figure 23: Signages in workshop room.



Figure 24: Wayfinding with terrazzo and yellow epoxy as the floor materials.



Figure 25: The wayfinding and signage of front office and production room.

At the final Prototype phase, a collaborative design has been planned since the initial Prototype phase and it will be implemented on a real site. At this stage, the students and the owner choose an alternative design to be executed. After the final design has been decided with the owner, the students will begin the process of making furniture according to their task. Furniture and design elements consisted of 3 displays such as racks made of wood with doff varnish finish, recycled pipe with black spray paint finish for the wall display, and 2 pallet woods with additional LED strips to embellish the display so that it is not only functional but also attractive.

The styling process is done by adhering to accessible design principle by implementing the dimension and standard display height for people with disabilities (Figure 26).

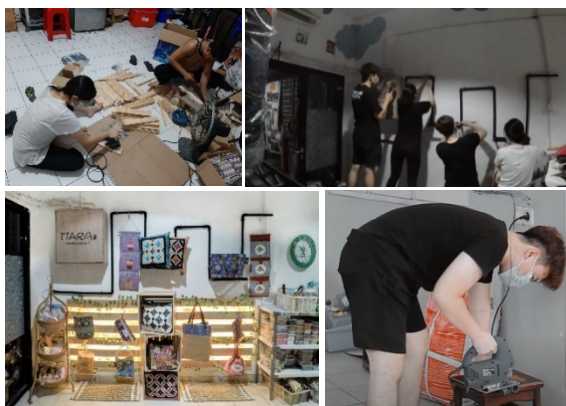


Figure 26: The process and result of styling step (Source: Geraldine, 2020).

The final stage is the Test phase. It consists of an evaluation given by the owner to the design implementation results in the styling process of the Tiara Handicraft store (Figure 27). This phase will also be carried out by the group tutor to evaluate the overall design results from the Empathize phase to the Prototype phase. The tutor conducts exploratory (or formative) evaluation of the design thinking method used, then an assessment (or summative) of the final design result will be carried out, and lastly through the online final evaluation, the tutor validates (or verify), whether the final results are consistent with the design thinking process (Rubin & Chisnell, 2011).

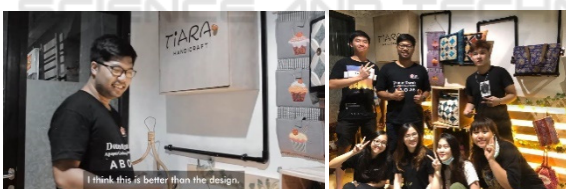


Figure 27: The evaluation process with Tiara Handicraft's Owner.

## 4 CONCLUSIONS

The implementation of accessible design principle in the interior of Medium-scale Business Tiara Handicraft store is important because it facilitates the workers with disabilities so that they can be more productive and independent. The "MENARIC" concept presents a design with a new atmosphere so that the workers and visitors can feel comfortable when shopping and are able to access the desired products easily. Hopefully, after implementing the accessible design, the disabled employees, especially mentally disabled (*tunagrahita*) and physically

disabled (*tunadaksa*) will be more productive and independent. Implementing a systematic shelving system, easy access to the interior of Medium-scale Business Tiara Handicraft store with the addition of a ramp and folding stairs facilities, as well as the application of wayfinding and signage, can help the users especially disabled people to find the desired place and products. Moreover, using the design thinking approaches can ease the process of creating facilities based on accessible designs principle to help disabled people because the results obtained are following user needs and also according to the user requirements.

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