



The Use of Augmented Reality to Promote Public Awareness for Deaf Workers

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ABSTRACT: Technological innovations have been specifically built for people who are disabled. The technological development tools were designed to make human work more manageable. Augmented Reality is one of the technologies discussed in this study. This study will focus on solving the problems encountered in the SMEs assisted by Regional Nation Craft Council (Dekranasda) Nusa Tenggara Timur, Café Inklusi (Kopisaa), where disabled workers experience communication problems. Most visitors are not aware of the presence of deaf workers, as well as sign language. This research process uses descriptive qualitative research methods, and Design Thinking as an analysis tool is deemed necessary for the characteristics of the problems that arise. After the analysis, a solution was proposed to help the disabled worker in Café Inklusi (Kopisaa) communicate more effectively using Augmented Reality technology in social media filters. The solution focuses on how AR technology can play a role in helping overcome deaf workers' communication problems, increase awareness of deaf workers and sign language, and help promote the cafe where they work.

KEYWORDS: Augmented Reality, Deaf Workers, Design Thinking, Public Awareness.

1. INTRODUCTION

The world is shifting toward sustainability, which includes sustainable human, a sustainable economy, sustainable environment, and sustainable social [1]. The discussion of sustainability cannot be separated from the SDGs, or Sustainable Development Goals published by the United Nations, which include 17 goals [2]. SDG point 10 (Reduced Inequalities) is one of the SDG points discussed in this research. The vision of SDG number 10 is to eliminate inequality between individuals, regions, and countries, ensuring that no individual is left behind, and the topic about people with disability also included. According to data compiled by the Central Statistics Agency [3], there are 7.04 million disabled workers in Indonesia, accounting for approximately 5.37% of the total working population. The government has also long issued regulations to facilitate and grant rights to people with disabilities, as stated in the mandate of Law No. 8/2016 on 22 rights for people with disabilities, one of which is employment [4].

Even though the Indonesian government is quite aggressive in proclaiming the workforce for people with disabilities, the statistics in the data still show a low percentage regarding the absorption of workers with disabilities. One of the primary problems that arise is unavoidable gaps regarding the interaction between persons with disabilities and those people without disability in communication, interaction, and transactions [5]. To minimize this gap and to facilitate persons with disabilities to make it easier for them in terms of interaction, communication, and work, it is necessary to have a system or technology so that communication trades can be more effective and efficient. During the Industry 4.0 era, all technological development tools were designed to make human work more manageable [6]. Augmented Reality is one of the technologies discussed in this study. In general, Augmented Reality (AR) is a technology that simulates the appearance of a real object in 2D and 3D. The goal of this technology is to create a visual representation of an object or shape [7].

AR is frequently used in medicine, gaming, and the manufacturing industry. This technology is most commonly used to visualize GPS in vehicles as a tool to provide 2D and 3D depictions of travel routes. The development of Augmented Reality (AR) technology has a high potential for use as an assisting technology for people with disabilities. AR can visualize abstract objects projected in real-time in the form of 2D or 3D shows. It can improve user experience by stimulating the process of understanding and receiving information from objects projected by technology. This technology can help streamline the process of communication, interaction, and transactions in daily life for people with disabilities who have certain conditions. Social inequality is defined as an unfair situation and a form of the negation of equality. Also, an idea of injustice and a violation of some equality [8]. These situations are most often



experienced by people with disabilities, who do not have the same rights and opportunities as others due to different health conditions. Persons with disabilities must make more significant efforts to fight for the order of others' behavior toward them and to equalize their social class [9]. The highlight of this study is public awareness of disability workers in Café Inklusi (Kopisaa). In order to create inclusiveness and pay more attention to how we should behave and interact with people with disabilities, we must raise public awareness of their presence.

Poltak S. Sinambela (2006) defines the public as general, society, and the state. Awareness is the conscious knowledge of an event or situation [10]. Although these disability workers have received special training to become waiters and waitresses, miscommunication and misperceptions still dominate the problems between disability employees and customers who come to the cafe. Many customers did not know how to respond because they could not speak sign language, so the customer experience was not too pleasant and seemed troublesome. Ineffective communication between disabled employees and customers will indirectly affect customer satisfaction and reduce customers' potential to return to the café [11]. Cafe owners need to find out a system or technology to be able to take advantage of these sentiments to attract customers. The aim of this study is to increase the awareness of visitors and the general public regarding the existence of people with disabilities, especially deaf friends who work at this Inclusion Cafe (Kopisaa). In addition, cafe promotion is also a problem that must be identified. In conclusion, the questions that arise in this study are, How to raise awareness of hearing friends (Teman Dengar) which is the disability worker, towards deaf friends (Teman Tuli) which is the customers, especially in understanding sign language? and How to promote Café Inklusi (Kopisaa)? The solution of the study is expected that this cafe can continue to grow and provide more benefits through its vision and mission for the people of NTT in general, and deaf workers in specific.

2. RESEARCH METHOD

This study was carried out through several processes, including identifying the problem, determining research objectives, determining the root cause of the problem, conducting business solution analysis, and finally implementing the proposed solution. Which is illustrated as follows:

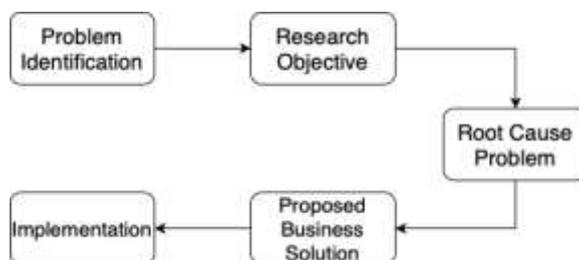


Figure 1. Research Process

2.1 Conceptual Framework

In the conceptual framework of this research, this conceptual framework is created to create a thinking model that is linked to relevant theories, as well as to support and test the proposed business solutions. Along with the framework will provide the flow of research step from the first step to the end.

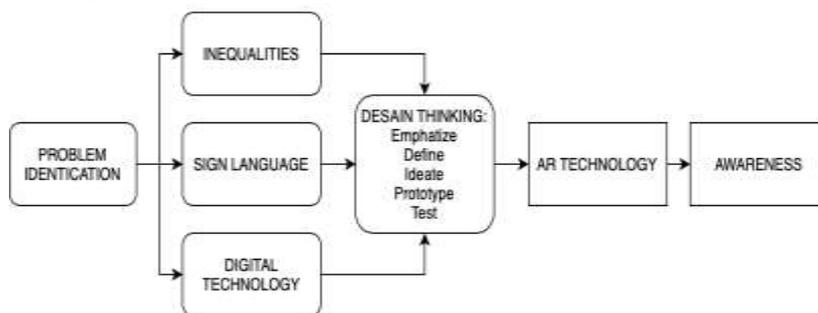


Figure 2. Conceptual Framework

2.2 Data Collection

Most of this research uses qualitative data collection methods, one of which is interviews. This interview was conducted with Desiyanti Jacob, the owner of Café Inklusi (Kopisaa), and Rizky, one of the disability workers. To learn more about the interviewer's attention, circumstances, situation, frequently occurring business problems, and other information about the cafe using empathy map tools. Observations were made around the Café Inklusi (Kopisaa) environment, located on the first floor of the Dekranasda NTT office. This observation was conducted to identify the business environment, perceived atmosphere, and potential business problems that may arise from the perspective of a third party.

There were also observations made to analyze the behavior and interactions of disabled employees with customers who visited the cafe. This study also uses the brainstorming method to identify a framework related to problem-solving and finding the best solution. This brainstorming method works in tandem with the primary method, design thinking. Brainstorming canvas is used as an incubation method to bring out the potential for creative ideas that can be used to proposed the problem at hand and then determine the best idea to implement.

2.3. Research Analysis Method

The data analysis methodology used is a qualitative descriptive method. As previously mentioned in the data collection, the data were obtained from interviews, observations, and literature studies. The method is selected because the problems that arise require in-depth understanding, which requires a more in-depth data collection instrument that other research methods cannot do. Descriptive analysis is considered to be an appropriate analytical data as a qualitative data analysis method, aiming to identify how communication can solve social problems that arise. This analysis is only used to identify what business problems arise, while to solve business problems, will use the design thinking method

Design thinking is a method used to identify, explore, and process a design idea to answer a problem or invention. Design Thinking as a tool to formulate solutions, a method is needed that can identify problems based on the characteristics and needs of the user [12]. Because design thinking requires an out-of-the-box analysis as the output of the identified solution, qualitative research methods are needed to obtain more in-depth data results.

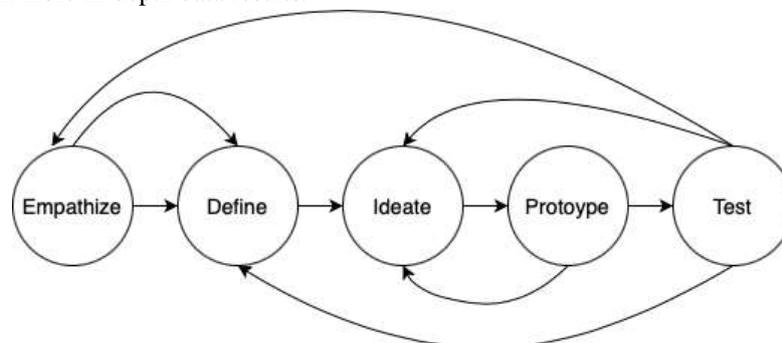


Figure 3. Design Thinking Mechanism

Design thinking is intended to be a tool for solving innovative, user-oriented problems and solving problems that are ill-defined or wicked problems. The Design Thinking method is needed to launch a prototype of the solution to the proposed problem because one of the Design Thinking stages has prototype resistance, so this method is considered appropriate for research and in formulating solutions to business problems that arise. Overall, design thinking has five stages, namely Emphasize, Define, Ideate, Prototype, and Test.

3. RESULTS AND DISCUSSIONS

3.1 Empathize

The empathize process focuses on how the researcher perceives surrounding phenomena that may have direct or indirect contact with the user [13]. Researchers used empathy map tools to identify the process in this study. After processing data sources from observations around the cafe regarding interaction, communication processes, and interviews with the owner of the Inclusive Cafe (Kopisaa) and one of the disability employees, Empathy Map is used.



Figure 4. Empathy Map café owner.

The empathy map results from Desiyanti Jacob, the founder of the Inclusion Cafe (Kopisaa), in the Hear section that visitors are uncomfortable ordering at the cashier's desk. They are only able to communicate in writing. As a result, many visitors require assistance in communicating spontaneously, which slows their food ordering process. Furthermore, visitors in the SEE section frequently appear awkward when interacting with employees with disabilities, ordering drinks, conducting payment transactions, and other communications. In the Think and Feel section, the owner is concerned that the turnover of his cafe business will decrease due to visitors who are uneasy about hiring employees with disabilities. As a result, the owner considers various solutions to the problems. So far, the owner has not considered any alternative to using paper or writing aids to facilitate communication between disabled employees and visitors. Based on the interviews, the owner then wants to find a solution to this problem in the Say and Do section. As a result, the owner felt Pains lacked awareness of employees with disabilities during the Pains and Gains sessions. It was feared that it would impact visitors to the cafe. Furthermore, the results in Gains user sections is wanted to get methods or tools that can be another alternative in facilitating employees with disabilities interacting with visitors, not limited to writing and lip reading only.

The empathy map is then identified by Rizky, a barista with disabilities who works at the Inclusion Cafe (Kopisaa). Because the source person is deaf, the Hear section is skipped, and the focus shifts to the See section. In this section, informants frequently see visitors who come to the cafe when they need help but are uninterested. In other words, they are unaware of the informant's condition as a disabled person, making it difficult for the informant to understand the visitor's intent.



Figure 5. Empathy Map Disability Worker

The interviewee expressed disappointment in the Think and Feel section because his knowledge of coffee and its concoctions could not be explained to the guests who inquired. Following that, in the Say and Do section, employees with disabilities are currently limited to interacting through writing and reading visitors' lips when speaking. In conclusion, resource persons find it challenging to communicate with visitors in Pains, and Gains is an alternative tool or method of communication that is more effective than writing notes or lip reading.

3.2 Define

Following the completion of the previous stage, the next step is to define the root cause of the findings that emerge during the empathize process. The point of view tool will be used in this study. This point-of-view tool is used to interpret the previous stage's findings and prioritize the problems that arise more specifically for the users involved.

Table 1. Point of View tools identification

User	Need	Insight
Desiyanti Jacob (Cafe Owner)	The need to facilitate employees of deaf friends so that they can interact and communicate more effectively with visitors	A user wants the continuity of the cafe, increased visitors, and a conducive cafe atmosphere.
Rizky (Disability Employee)	The need to be able to explain the intent of the speaker to visitors, not limited to writing on paper and reading lips.	A user wants another alternative to communicate with listeners and visitor awareness of the presence of employees with disabilities in the cafe.

According to the point of view table mentioned above, the two informants' needs are a method or tool that can be used as an alternative. It is required as a communication tool between employees with disabilities and visitors who come, most of whom are non-disabled people.

3.3 Ideate

The following stage is Ideate. This stage is carried out as an incubation to bring out the potential for creative ideas that can be used to solve the problem at hand and then determine the best idea that can be presented. In this stage, a brainstorming canvas is used to identify data analysis [14].

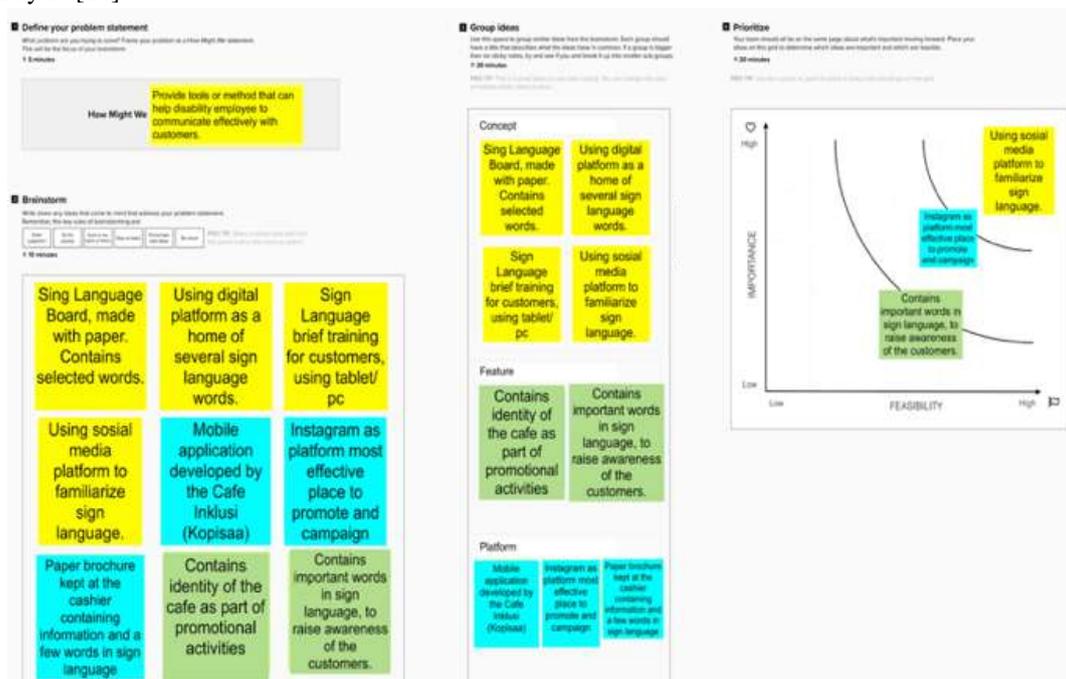


Figure 6. Brainstorming Canvas Identification

Ideas that meet the eligibility and high-importance criteria are classified into a concept, platform, and feature. The three concept categories are using social media platforms to familiarize sign language, Instagram as the most effective platform for promoting and campaigning in sign language and disability workers, and using Important words in Sign Language, including raising customer awareness.

3.4 Prototype

The prototype stage begins to be explained in the design of solutions identified in the previous stage—starting with the flowchart, sketch drawings, and features contained therein [15]. The first, the prototype flowchart, will be described in the following figure.

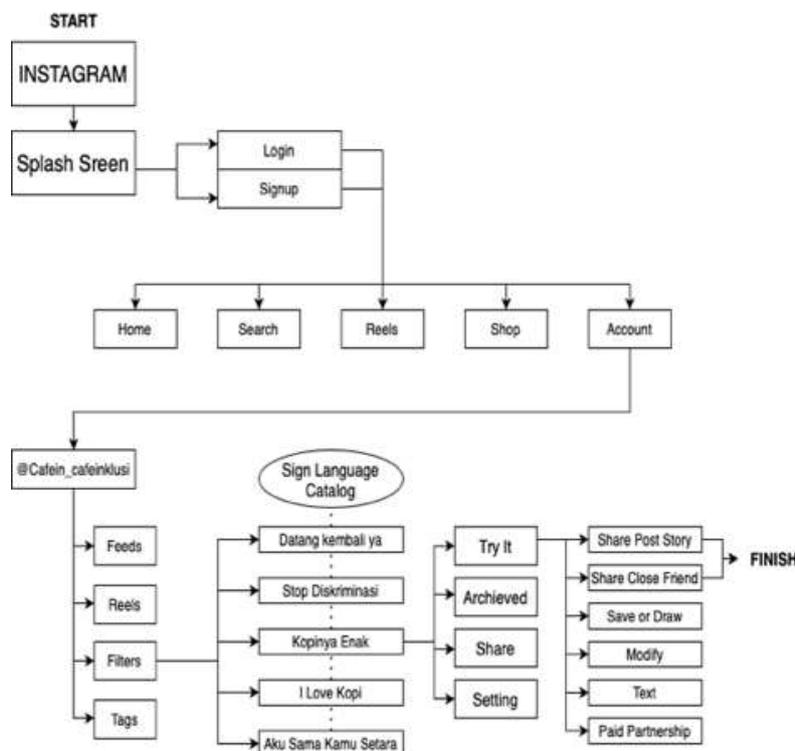


Figure 7. Prototyping flowchart.

After it has been identified that the prototype to be developed is Augmented Reality (AR) technology inserted into the Instagram filter, the next step is to make the central sketch in the developed filter design. The filter design will be used to look like the photo above, with a frame in the middle to insert a video of a visitor who wants to post and try Instagram filters. The identity logos of Cafe Inklusi on the right and Kopisaa on the left are displayed on the right and left sides of the display, respectively. Below the display is a simple sentence in the desired sign language.



Figure 8. Filter Instagram Design Sketch and results.

Following the identification of the design sketch, the designed filter is sufficient according to the sketch made below. A light brown colors spectrum was chosen to resemble coffee, and several images depict coffee. The prototype is an Augmented Reality (AR) filter package embedded in the Instagram social media platform, which can be accessed via the cafe's Instagram account, @Cafein_cafeinclusion. Visitors to the cafe can use this feature for free to communicate with employees with disabilities or deaf friends more effective than simply writing on paper. Visitors with personal and shared Instagram accounts can access the filter by visiting the cafe's official Instagram account and using their respective devices to make technology use more practical and economical.



Figure 8. Filter Instagram Prototype Result.

3.5 Test

This research will be explained in qualitative for it to be formulated and propose problem-solving solutions that are valid, reliable, and on target [16]. In terms of validity, the participation of cafe owners in developing prototypes with the authors—the owner's involvement in carrying out the design thinking process—is considered valid and proven. In July 2022, the prototype was made available through meetings and discussions in Kupang, East Nusa Tenggara. Following a face-to-face meeting in July, it was agreed that the owner would create video content for the filter.

Furthermore, regarding reliability, the owner has discussed all prototype designs by the perceived needs and problems. The owner determines the words in the filter design using the style and terms of sign language used by employees with disabilities daily. Besides that, added sentences chosen directly by the owner, which is considered very important to be added to the design.

4. CONCLUSION

The answer to the problems that arise in the research object, as formulated in the previous analysis chapter, is through an analysis carried out based on data collection methods and analysis to plan a suggested solution—using descriptive qualitative research methods with data analysis from interviews, observation, brainstorming, and literature review. Then, using the Design Thinking method, it successfully gathered material to analyze the problem to identify the best solution. This five-stage method produces a solution output from AR technology embedded in the Instagram social media platform.

Cafe Inklusi (Kopisaa) can use this filter to help employees with disabilities communicate, interact, and raise visitor awareness of employees with disabilities and sign language. Many users can access the AR filters embedded in Instagram's features for free and are simple to use. In addition to assisting employees with disabilities and raising visitor awareness, it can also serve as a promotional event for Cafe Inklusi (Kopisaa) because it uses Instagram filters as an effective communication tool for visitors and employees with disabilities. This AR filter is not only used for the sign language catalog but there is also a posting feature where visitors can directly practice and share the sign language available in the catalog. Currently, no similar place in Kupang, NTT, hires employees with disabilities and uses the same AR technology. As a result, this Instagram AR filter can be an attraction in and of itself for customer promotional activities.

By combining AR and Instagram technology, as described in the previous chapter, the solution to the problem is formulated using the design thinking method. Which has five stages, namely Empathize, Define, Ideate, Prototype, and Test, so that the prototype section describes the solution to the proposed problem in detail.

AR technology solutions on Instagram filters have had a major impact on sales and promotional events from Cafe Inklusi (Kopisaa). Apart from being an effort to facilitate the welfare of deaf friends with disabilities, it also has benefits and value for cafe promotion agenda. Through posting and sharing features, this AR filter Instagram is expected to have an impact on increasing visitors and sales.



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