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Elderly and Smartphone Apps: Case Study with Lightweight MySejahtera

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Abstract - The outbreak of Covid-19 in the past 2 years has made the usage of contact-tracing app almost mandatory in Malaysia. Though the usage is seeming to be simple, but one interesting phenomenon can be observed in Malaysia is that most of the senior citizen are found not using smartphones regularly. While check-in through MySejahtera (the primary contract-tracing app used in Malaysia) for business, premises, and transports has made compulsory, it does bring a lot of inconveniences to the elderly. Many elderlies start to learn how to use smartphone and government has also taking initiative by providing free or low-cost smartphone with data plan. However, it is important to note that many apps are not customized for elderly navigation. Thus, we would like to study how does an app can be strip down so that the essential functions can be remained and keep minimal for elderly usage. The interface design, color, and button sizes are also important to consider. In this study, MySejahtera has been used as an example to strip down and tested its lightweight version among a group of elderly.

Keywords—elderly friendly, mobile application, stripped down mobile apps, MySejahtera, user requirement, usability

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I. INTRODUCTION

MySejahtera [1] is a mobile application developed by the Government of Malaysia, mainly used to trace the contact cases, and make vaccination appointment. On top of that, it has multiple functions, including the functions to view the risk status of the user, keep track on nation cases, alerts, news, quarantine, monitoring, and so forth. It has become one of the mandatory apps of Malaysian, as check-in to all buildings and premises are made compulsory. It is also the primary app to check and track the vaccination appointment.

The severity caused by Covid-19 hampered elderly much greatly than a healthy youngster [2], thus getting all senior citizens to complete their vaccination doses has become primary mission of the nation. However, it is not easy especially when the elderly does not know how to navigate with the apps and miss all the important information and appointments given by the government.

Other than that, they also facing issue to scan the QR code for check-in, for an instance, one may does not know how to place the QR images within the scanned area, hand might be moving too slow and force the screen to hibernate. Thus, many are choosing to check-in themselves with a traditional way, such as writing their names on a

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paper. But this will also raise another hygiene issue where everyone is sharing the same public pen. This method also making the tracing almost impossible and not practical. Thus, using MySejahtera is one of the best ways.

So, the research question in this paper will be how can we leverage it for elderly? The best we could think is to strip down the current version and make it more elderly friendly. Thus, in this paper, we are proposing to strip down the MySejahtera so that it remains only the check-in function, the status bar of risk, and vaccination appointment function. Other information such as traveler, infectious disease tracker, health facilities, KKM newsletter, and many others are hidden from the main view.

On top of that, considering the education background and trend in Malaysia, we noticed that not all senior citizens can understand Bahasa or English. While the current MySejahtera only made available in these two languages, we also enabled more languages support in the developed lightweight version.

II. EXISTING CONTACT TRACING APPLICATIONS

Contact-tracing app is important in the global usage, and this has been substantiated when we can see all countries also have their own contact-tracing apps. The design and GUI might be differed but all of them are served for similar purpose, which is to reduce the chain of Covid-19. Thus, in this section, we will review different GUI designs of different kinds of contact-tracing apps. It is also interesting to discover if any of them are customized or made elderly friendly.

A. MySejahtera

As shown in the Figure 1, the main page of MySejahtera is very resourceful for us but it may not be the case for elderly as they will confuse which button to press to check in. In terms of language support, the current version only made available in Bahasa and English. The fact is not every senior citizen can understand in both or either of these two languages.

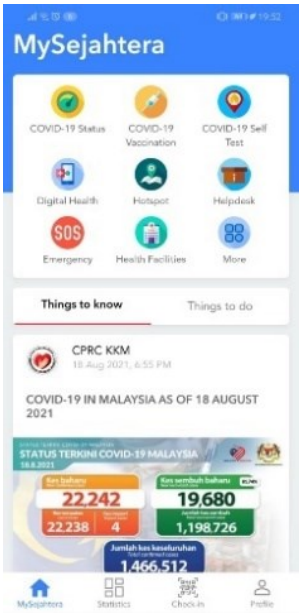

Figure 1. MySejahtera – Main Page.

B. NHS Covid-19

The NHS Covid-19 [3] mobile application is primarily used to detect and trace the positive patients who live in England or Wales, Scotland, Northern Ireland, Jersey, or Gibraltar. Figure 2 shows the main page of the NHS. Very similar functions with the MySejahtera, it is very resourceful. The arrangement of items is better (for elderly) because it used tabular format, and thus making the reading and interpretation much easier. One merit of this app is it supports multiple international languages.

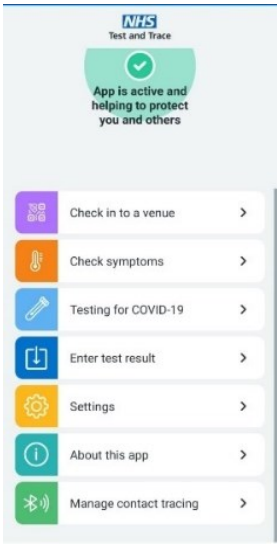

Figure 2. NHS Covid-19 – Main Page

C. PeduliLindungi

The PeduliLindung [4] application was developed by the Ministry of Communication and Information (Kominfo) and the Ministry of SOEs to assist the Ministry of Health and the Task Force in dealing with the COVID-19 epidemic in Indonesia [5]. Very similar functions with the MySejahtera, the main page of PeduliLindungi (as shown in Figure 3) is very resourceful but may not be elderly friendly too, as it has too many buttons and functions which may make the elderly hesitate and does not know where to start from.

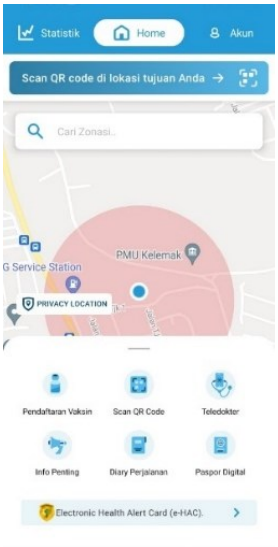

Figure 3. PeduliLindungi – Main Page

D. StoppCorona

The StoppCorona [6] is published by the Austrian Red Cross on behalf of the Austrian Federal Government's responsible authority, the Federal Ministry of Health. StoppCorona is using an exposure notification system to track the Covid-19 cases.

In this application, the first-time user will be guided and trained on how to use the application. Comparing to others which had been reviewed earlier, the interface of this application is rather simple and easier (with lesser functional buttons) for the elderly to use, as shown in Figure 4.

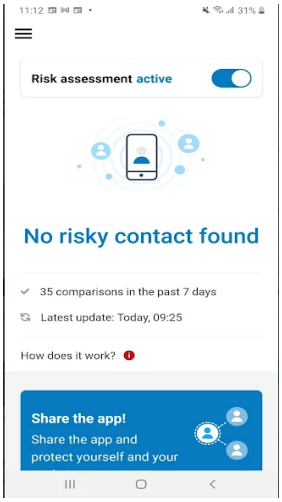

Figure 4. StoppCorona – Main Page

E. SwissCovid

The SwissCovid [7] was develop by the Switzerland county. It alerts the close contact patients through exposure notification. As shown in Figure 5, the main page is considered easier to navigate as it clearly showing the button of "Check-in" comparing to others. In this app, it requires the user to check-out too whenever he or she left the building or premises.

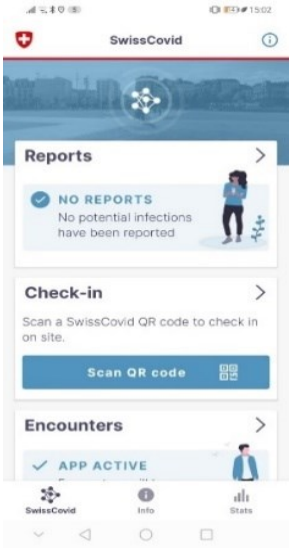

Figure 5. SwissCovid – Main Page

At this point, we noticed none of them are customized for elderly, though some of them may be easier to use but they are not built purposely for elderly. It is not wise to rebuild an app for elderly, thus, we are looking from the perspective of strip down instead.

III. DESIGN OF MOBILE APPLICATION FOR ELDERLY USE

In view of we would like to strip down the app for elderly friendly, it is important to hear what the expert says about. In this section, some studies related to the user interface design elements such as text size, font, and background color which may affect the elderly's experience will be reviewed and referred when developing the lightweight MySejahtera for elderly.

A. Elderly Unfriendly Issues

According to [8], mobile apps for elderly should be meaningful, engaging, user-friendly, and encourage technology adoption. One of the common unfriendly situations found is the size of the navigation button of the apps. The general size used in most of the apps is too small for elderly and causing them facing difficulty in pressing the button correctly. While switching from the conventional phone to the smartphone without the keypad, they tend to "touch" on wrong number on the touchscreen when the size of button is not big enough for them. Not only the size does matter, [8] also suggested that having a good spacing between the buttons will be helpful for elderly. They also highlighted that the font size of the display on the button does affecting the visual and navigation experience for elderly. In general, their studies shown that elderly preferred larger fonts and larger icons.

The similar observation was reported in [9] too, indicated that a group of users whose age of above 60 mentioned that they tend to press on wrong number or navigate on wrong button when the button size or font size is small. On top of this, the surveys also indicated that the elderly feel confused and hesitate to use the apps when there are too many menu buttons. This is because they are not able to remember the different operations which associated to each of the menu. The situation gets worse when the text size is small.

B. Recommended Elderly Friendly - GUI Designs

In the study of [8], they suggested that the visual design must be altered to meet the needs of the senior citizen. Specifically, it should be larger than the normal text used in the apps. The suggested font size is not less than 12pt, whereas the height of button or icon should be at least 25mm on the screen. The app should allow the user to customize and select their preferred text size, color, and contrast setting.

On the other hand, [10] suggested if the app is meant for elderly who is older than 60 years old, the font size should be between 36pt to 48pt instead. It is also important to keep the app to use one-level navigation instead of menu structures. All menu buttons should be placed at the bottom of the screen so that when they press, their finger will not hide the central view of the screen.

In term of color settings, [11] suggested that using a wide range of colors might resulting in continual refocusing and cause the eye tiredness. Thus, the contrast of colors should only be used to improve the text readability and not to distort the foreground text. Usage of dark and patterned backgrounds are not recommended for elderly too.

IV. PROPOSED LIGHTWEIGHT MYSEJAHTERA

After considering the expert's view, we would like to propose the scheme of strip down the current MySejahtera. The check-in function of MySejahtera is kept in this version because it plays the most vital part in tracing the close contact and reduce the chain. Secondly. the risk status of user is also kept mainly for self and cross-referencing. Third, the vaccination status is also remained because it carries the digital Covid-19 vaccination certificate of every Malaysian. To ensure the original tracing functions are not distorted, all historical activities are kept too but it will

be hided from the main view of the page. The newly developed and strip down a.k.a. lightweight MySejahtera main page is shown in Figure 6.

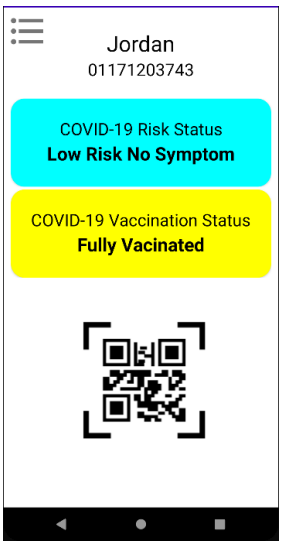

Figure 6. Main Page of Lightweight MySejahtera

In this version, all security protocols [12] are still maintained at the backend, but the number of buttons is greatly reduced so that it reflects only the necessary actions needed from the elderly, especially the function of check-in. It is purposely designed to be such straightforward so that it will not confuse the elderly on which button to press when they want to enter a building or premise. This is also designed by considering the general technological skills [13] among senior citizens in Malaysia.

V. TECHNICAL IMPLEMENTATION

A. Color Indications of Different Covid-19 Risk Statuses

Four simple and yet sufficiently contrast colors are used to indicate four different statuses, as shown in Figure 7:

- Cyan: indicating the user is low risk with no symptom
- Dark Yellow: indicating the user is on casual contact but not showing any symptom
- Brown: indicating the user is on suspected and monitoring case
- Red: indicating the user is confirmed to be the positive patient

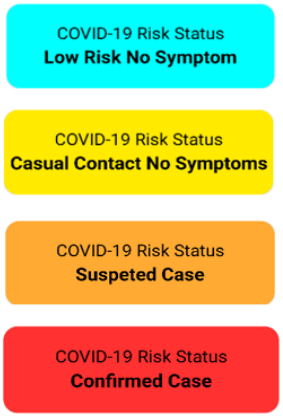

Figure 7. Color Indications for Different Risk Statuses

The implementation can be demonstrated with the pseudocode below.

```
START
        SET risk = 0, color = "CYAN"
        IF risk == 1
           status = "Casual Contact No Symptoms"
           color = "DARK YELLOW"
        ELSE IF risk == 2
           status = "Suspected Case"
           color = "BROWN"
        ELSE IF risk == 3
           status = "Confirmed Case"
           color = "RED"
        ELSE
           status = "Low Risk No Symptom"
           color = "CYAN"
        ENDIF
END
```

B. Color and Text Indications of Covid-19 Vaccination Status

Two colors are used to indicate the vaccination status, which shown in Figure 8:

- Grey and a text of "No Vaccine": indicating the user has not been vaccinated
- Sharp yellow and a text of "Fully Vaccinated": indicating the user has been fully vaccinated

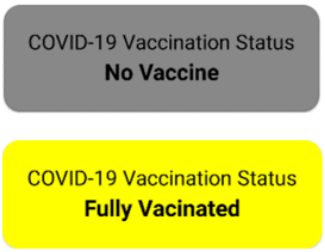

Figure 8. Color Indications for Different Vaccination Statuses

In Malaysia, every adult must be at least taking 2 doses to be claimed as fully vaccinated. Thus, those who took only 1 dose will be deemed as not vaccinated as usual. The technical implementation is demonstrated in the pseudocodes shown below:

```
START
    SET vaccine = 0, color = "GRAY"

        IF vaccine == 1
                status = "Fully Vaccinated"
                color = "YELLOW"
        ELSE
                status = "No Vaccine"
                color = "GRAY"
        ENDIF
END
```

C. Check-In Functions with QR Codes

Similar with the current MySejahtera, the user needs to scan the QR code before entering a building or premise. The user can scan the QR code through the default camera permission, and can be further explain in the pseudocode below:

```
START
    CHECK camera
    ACCESS camera
    GET permission
    IF no able get permission
                GET permission
        ELSE
                then scan QR Codes
                then store data
                then show the result
    ENDIF
END
```

D. Historical Activities Log

All historical and activities log will be stored and can be retrieved whenever necessary, as below:

```
START
        GET firebase qrstore data
        FOR
                then display all data
        ENDFOR
END
```

E. Multiple Languages Support

In this elderly friendly version, another 2 languages are added, which are Chinese and Tamil, as shown in Figure 9.

Figure 9. Additional Supported Languages – Chinese and Tamil

The user can select and customize the language they preferred, where the technical implementation can be explained as below:

```
START
    SET language = 3
        IF selected == 0
                then display Tamil
        ELSE IF selected == 1
                then display Bahasa Melayu
        ELSE IF selected == 2
                then display Mandarin
        ELSE
                then display English
END
```

VI. EXPERIMENTAL TESTING

To our best effort during this hard time, where visiting to public and approaching to unknown person are discouraged, we had invited 50 senior citizens (age > 60 years old) to test the developed Lightweight MySejahtera. The distribution is shown in Figure 10. Among them:

- Age of 60 to 65: 25 users
- Age of 66 to 70: 10 users
- Age of 70 to 80: 10 users
- Above 80: 5 users

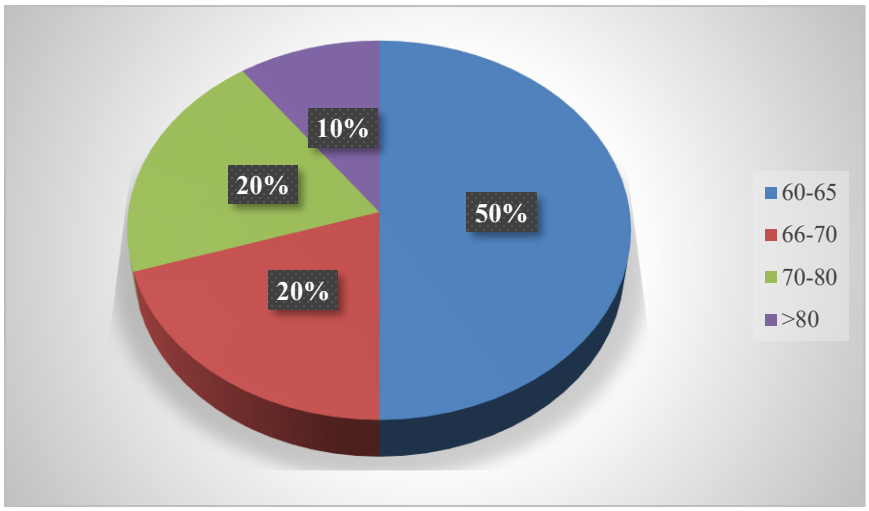

Figure 10. Distribution Based on Age

As shown in the Figure 11, 30 of them indicated that they used the current MySejahtera whereas another 20 did not. After checking with them, the main reasons were:

- They do not have smartphone
- Even those with smartphone, they found it very difficult to understand and do not know where to start

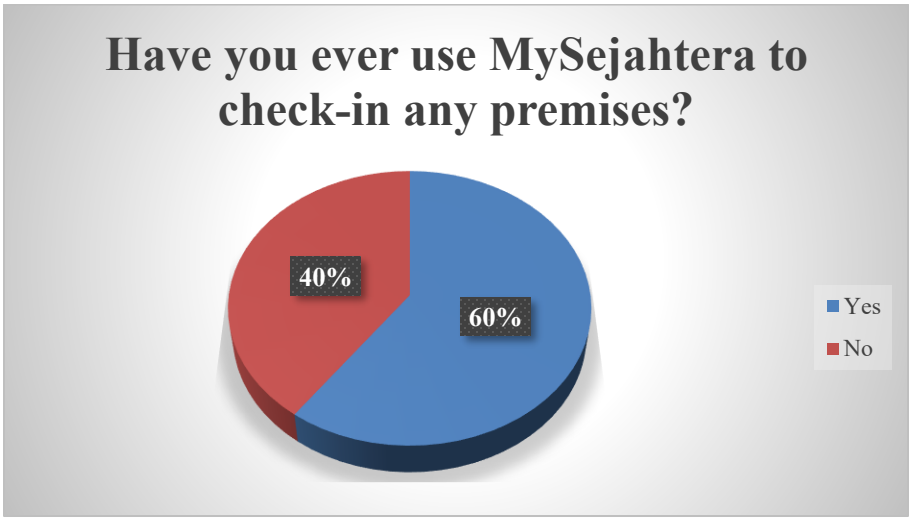

Figure 11. Percentage of Experienced Elderlies on Using MySejahtera

Thus, we had invited them to try and use our version from our pre-installed smartphone. The interviewed session preceded by a simple introduction about the developed strip down MySejahtera app. We walked through every button on the screen. Right after the introductory sessions, they were requesting to use the apps to scan a QR image. Figure 12 shown that among the 50 respondents, 45 of them understand and know where to press to scan the QR code after the briefing and hand-on training.

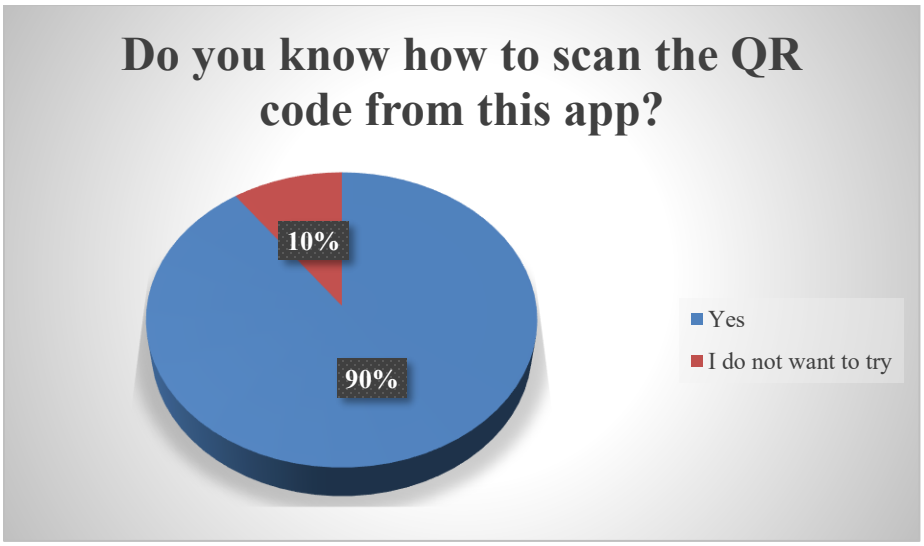

Figure 12. Percentage of Elderlies Who Are Able to Scan QR from the Proposed App.

From here, we substantiated that the main advantage of strip down MySejehtera is to ease the interpretation especially among the elderly group who are not familiar to mobile apps. Of course, by saying so, it is also deemed that they are fine to use the apps with minimal functions and information. Another 5 are still hesitated to use as they feel it is easier to remain with manual check-in, and some claimed that their children will group check-in for them. On top of checking their ability to locate the QR scanning function, we also collecting some of the after-used feelings from them regarding the proposed app.

Among the 45, 39 preferred to use the Lightweight version whereas another 6 chose to remain with current version as they want to view other news circulated from the government. Not to deny, these 6 are among the youngest among them.

We do not give a long or written survey as it may not be user friendly for the elderlies to answer all of them. Most of the feedbacks are obtained through an oral interview right after they tested the developed app. From the observation, we noticed the openness and acceptance to the proposed strip down Lightweight MySejahtera.

VII. CONCLUSION

This study has shown a successful exploratory to strip down an existing app so that it is more elderly friendly. We believed there will be more “elderly” mobile users in Malaysia from now onwards ever since the launching of MySejahtera since last 2 years. Though this app may be stopped using one day, but undeniably, it is one of the initiatives to make the elderly in start learning using smartphone and navigate apps on touchscreen. Thus, we foresee more apps should be customized and made friendly for them in the future.

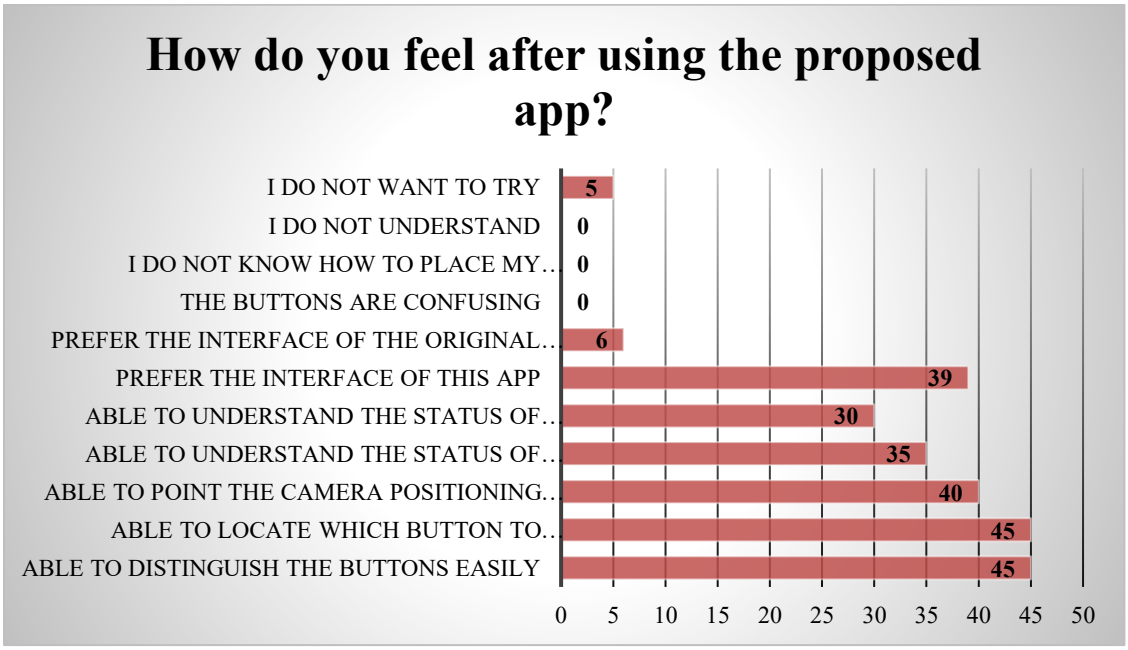

Figure 13. Summary of Survey Results

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