

Investigating Usability of Government Mobile Application in Bangladesh

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This Report Presented in Partial Fulfillment of the Requirements for
The Degree of Bachelor of Science in Computer Science and Engineering

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APPROVAL

This Project titled “Investigating Usability of Government Mobile Application in Bangladesh”, submitted by Abdullah Bin Masud, ID No: 191-15-12278, Ashik Ahamed Raian, ID No: 191-15-12193 and Nurun-Nahar Akter, ID No: 191-15-12117 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 24 January 2023.

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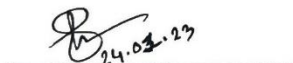
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We hereby declare that, this thesis has been done by us under the supervision of **Mr. Abdus Sattar, Assistant Professor, Department of CSE** Daffodil International University. We also declare that neither this thesis nor any part of this thesis has been submitted elsewhere for award of any degree or diploma.

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ABSTRACT

There is no argument that Mobile applications have changed every step of our life and made it faster than before. Bangladesh government provide government services through the mobile application. But When it comes about the usability of these applications, the people of Bangladesh are not satisfied. To find out the issues behind all these apps, we sort listed the Bangladesh government mobile applications and finalized nine government application. After a research on the listed apps, we found that most of the review about these apps on google play store are negative and critical. This study aimed to find out the usability problem of mobile applications owned by Bangladesh government and find out the major reason of usability problem of these applications. This study evaluated using analytical usability evaluation method which is known as Heuristic evaluation. In this process, usability experts use rules of thumb to measure the usability of user interfaces in independent walkthroughs and report issues. This investigation conduct by three usability expert and usability tester who completed their User experience study from google academic courses and also from renowned UX/UI courses. This study outcome indicate that selected government mobile applications of Bangladesh are crucially suffering usability problem.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The usability of a mobile application is the primary key behind every successful mobile application. Now a day's people are more familiar with mobile applications to accomplish their everyday tasks or need. Whether we need to shopping, electricity bill payment, gas bill payment, vehicle registration application, land registration, land information collection, Educational need, banking transaction, there is an app for everything [1]. For making people's life easier all developed countries Government provide Government services through mobile application and they try to provide best usability on every mobile application. Without a better usability an app turns into Headache for its user. Better usability is the key of success for a digital product. The reason behind of maximum abandoned application is poor usability and no on time update.

Bangladesh government also think about the citizen of Bangladesh and they time to time took steps for making the country more digital. For making our life easier and faster Bangladesh government took 500 app development process in 2015 [2]. Based on a research conduct in 2021, they found 100 mobile applications on google play store owned by Bangladesh government. In 2022 there is only 53 governments mobile application are available under Bangladesh government identity and 24 others government app are under control of private company [3]. Rest of the applications are shut down or removed from google play store for not updating the applications in time. Electronic media, newspapers also talking about the significant fall of government applications and bad usability. They inspected some of government mobile application and found that most of them are not getting updating, usability problem, slow issues, lagging issues, harmful malware detected, white screen issues and many more. Only some application work but they don't meet the user satisfaction level [3].

For make sure a product/application is ready to launch in public, there is some faces conduct by user experience expert. Usability testing is one of them and it's important to conduct testing and usability inspection before launch an application [4]. Experts most of the time evaluate with nelson 10 heuristics evaluation method. This is worldwide known method. Heuristic evolution can be conduct during the early stage of the of a project when the prototype only available and also after

the product launch [5]. This evolution process is cost efficient. So, it's not affect the cost margin of a product estimated budget. There is huge advantage if evolution conduct on the early stage. Where designer and developer got more feedback on early phase. In most articles it suggested to include at least 3-5 evaluators [4]. Here 3 usability expert conducting this evolution. Because we have limitations based on project rules. But 3 experts is also a standard number for this work [6]. After conducting the evolution on two phase, the outcome will bring usability problems of the selected apps. The result will indicate where should developer and designer need to focus on/ where is the lacking's of falling down of huge number of application. Fixing the concerns, those abandoned and unusable application will be usable again. Which will not only help the citizen, it will also create value on invested budget of government.

1.2 Motivation

Communication through mobile application is increasing rapidly. Everywhere people using the mobile application for communication, transection, application, bill payment, registration, shopping etc. Bangladesh government also making all government services which are possible through online for making the life of Bangladeshi citizen life better [2]. But citizen who are using those applications, not satisfied with the application performance. Electronic media and public talking about the usability of those application which is very poor. The number of user is significantly huge, who claim that the usability of those product is very poor. In this growing age of mobile application, Bangladesh building more mobile application for services. But if the product/application is not usable for the user, the work behind of those project will fall to the ground [7]. There is a good number of work on e-government website usability. But the number of work on government mobile application usability is very low. It the high time to make those abandoned apps usable again. And if the usability issues resolved, people will be benefited again and also government will create value of their work. Which will be beneficial for both.

1.3 Problem Definition

Usability is most important part of an application. Government applications of Bangladesh are badly suffering from usability problems. Most of the important applications like BRTA, Bangladesh bank, Bangladesh national portal, eipay and many more are not getting proper update for a long time [8]. Which is making significant bad effect on people while using these applications. Evaluating top selected applications by using Nielsen's 10 Usability Heuristics [6],

which are selected based on google play store reviews, user needs, and the user having critical usability issues. This will give a better solution to where to improve an application and in which section the designer needs to be more careful while designing. This will make the designer think before designing a new product for the government and improve those abandoned applications. Finally, make them usable and beneficial for all citizens of Bangladesh.

1.4 Research Questions

List of main questions, which mainly focused in this research:

- Which government mobile applications are mostly needed by the citizen of Bangladesh?
- Which government mobile applications are not getting update on usability for long time?
- Where people getting stuck/struggling with the applications?
- Where most of the selected applications are violating the usability rules?
- Which section developer & designer need to focus on while designing?
- How to make them reusable again?

1.5 Research Methodology

In Research methodology, we will describe the appropriate heuristics for this study. The selection process of evaluators for conduct the usability session. Brief of the research focus area to the evaluators so they know exactly what we are meant to do and cover during their evaluation. Describe the first and second phase of the evaluation process. The result from the evolution and discussion about concerns.

1.6 Research Objectives

This research objective is find out the overlooked sections in government app design process in Bangladesh. In this research we are using nelson heuristics evolution method to complete the study and show critical usability issues need to be fixed soon. So, the apps can back in usable form and beneficial for every citizen of Bangladesh.

1.7 Research Layout

Chapter 1: Will discuss about introduction, motivation of this study, Defining the Problem of this study, Research focused Questions, used Research Methodology and the expected outcome of our research based project.

Chapter 2: will discuss about background of this research and the related works.

Chapter 3: will describe the selection process of evaluators, methodology, mobile applications, heuristics, heuristics pros and cons and overview of heuristics.

Chapter 4: will discuss about severity, percentages and identified problems and result

Chapter 5: will compare the study result with the previous and related study.

Chapter 6: It describes about the conclusion of this research.

Chapter 7: Here all the references are listed used in this research work.

CHAPTER 2

BACKGROUND

2.1 Introduction

There are few usability study conduct on e-government website in Bangladesh. The number of research on mobile usability in Bangladesh is moderate. But the usability research on government mobile application is very low, around 0-1. Founded one work on government mobile application usability. Where they only compared the result of different types of heuristics. The outcome of their result was not clear enough [9]. There is no precise study on Bangladesh government mobile applications. This study is compared with Some related works which domains are same but those study are non-government mobile application. Some are foreign.

2.2 Related Works

The number of research on usability evaluation based on Bangladeshi mobile applications is moderate. But the number of research on others product/mobile app is good. Some related usability study has done very well.

A study followed a 3-step procedure to complete their research. First, they searched on play store by keyword based searched, focused on government applications. Second, the selected some application randomly from the play store app. Finally, they selected the highest downloaded government app from the google play store. They categorized all selected applications based on their category. They founded 61% of their usability problem are violation the heuristics- aesthetic and minimalistic design. They found total 406 problems on their selected applications, where the total number of mobile health application was 36. They got 21% occurrence, which mainly violate the heuristics 7 and their average severity level was 2.74. The study outcome shows that the heuristics H2, H3, H8 and H10 violating in high frequency. Alongside of heuristics 7 the other number of violations are also showing high violation rate. Which is also alarming for the usability. Most of the problem are in the category of catastrophic problems. But observing the full outcome, the come to the point that the heuristics 7 is violating most in all selected applications.[1].

A team of people conduct Usability Evaluation of a Government Mobile Application. They researched on finding out the critical issues related to usability of government mobile applications. In their study, they used Heuristics evolution method to find out the reason behind of all the government applications bad usability. By CASSM and CA they showed a good overview of their study, which brings out better information related to the applications usability problems. This study will help mobile application developer and designer to concern about their flows on the work and how to overcome them by check the concern list before and after the design process phase. Which will make a better impact on produce good and usable application.

It is a vital attribute that require a lot of concentration in crucial the assembly of a roaring mobile application. In this paper discuss Usability Evaluation of Government Mobile Applications by using 4 UE methods: Heuristic Evaluation, Cognitive Walkthrough, Claims Analysis, and CASSM. They got that Heuristic Evaluation and Cognitive Walkthrough solely fixity back view of interface style, While CASSM and CA will facilitate establish strong theoretical niceties. This study will help mobile application developers and evaluators in evaluating and developing mobile application for the deaf [9].

Using imperial research approach, Twenty-two post graduate students were participated in this study as expert usability evaluators. These results indicate that each website have good number of usability problems. Again, the results showed that the e-government websites of Bangladesh are mostly following Heuristic 10, Heuristic 5 and Heuristic 6 Nielsen's Heuristics. Whereas mostly overlooked guidelines are Heuristic 4 and Heuristic 7. On the other hand, Heuristic 3, Heuristic 8 and Heuristic 1 are shown a considerable high value. The highest value of Heuristic 4 indicates that while constructing the websites the developer mostly violated the consistency and standard of the websites [10].

Usability research conduct on a tour and travel mobile application using SUS. Their aim was find out the reason behind the all top rated mobile applications which are working significantly better with top rated score on google play store. They also able to know about the lacking currently this travel mobile app having. This information they got while the conducting the research on the application. They also tried to find out the reason behind be top rated application on the market

without get good feedback. This study outcome provides the good usability tips to improve an application related or close to their field. Also how to make alternatives and simply better services for the user [11].

A usability research conduct to present a recommendation for improvement of e-Government websites' accessibility in Bangladesh. In this research, both qualitative and quantitative methods have been used. To make the evaluation result more accurate, they have also taken an interview of the participants by an email or web base survey of the web designers of government websites was conducted for exploring some accessibility issues of such websites. the governments need to speed up the process of acquiring such skills by focusing on IT institutions to increase the number of students who have well and enough training in the respective fields with up to date technologies. Web programmers or designers may use tools that prevent accessibility errors [12] .

By conducting heuristics evaluation, a group of team find out the aggressive app development reason. They tried to find out the reason behind all those apps are developed and not getting update in the next step. After a research they found the single company mainly work for a multiple product development. So, they got less time while they developing the application. So they easily missed the process of perfect work and every time failed to come up with a good result. Also the pressure of development work is much, so they don't get time to recheck those apps to make them more usable based on user feedback [7].

2.3 Aim of our work

After study others works on mobile application usability and evaluation, we set our goal to finds out the usability problems Bangladesh government mobile application having badly and show the result of the study. So that government application development takes a look where they are doing wrong. People are talking about the bad usability of those mobile application. But the works on government mobile application usability issues are less in number. Its near to zero. No one working on usability issues about government mobile application of Bangladesh. So, we dig down top unusable government mobile applications, which are mostly needed by the citizen of Bangladesh. And come to a result, how to make them reusable again.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

There are two main phase to conduct usability evaluation. In first phase, recruiting a group of participants to perform the assigned task. The evaluators will play the role as observers, and they will fill the sheet. In Second phase, the evaluators will run the tasks and score the severity, describe the issues encountered while conducting, and provide recommendations.

3.2 Evaluators selection

For conduct a usability evaluation study, the evaluators must be expert. Evaluators never be our end user. Finding evaluators for usability evolution is hard. There is not good amount of evaluators out there and most of them are costly to hire[14]. We conduct this evolution on our own. Where one of us certified from google user experience course offered by coursera and another person is working as user experience consultant for 3years and also certified as a User experience designer from well-known organization. Another person also has good knowledge about usability and conducted 2-3 session of usability test [6]. Total 3 evaluators conducted this usability study which is a good number. Nelson's heuristics law refers that 3-5 expert is standard number for conduct a usability evaluation.

3.3 Methodology selection

There good number of usability inspection methodology available. Nielsen and Molich's 10 heuristics or another set, Ben Shneiderman's 8 golden rules as inspiration and stepping stones. We decide to use- Nielsen and Molich's 10 User Interface Design Heuristics [15].

Technology has changed rapidly science Nielsen and Molich's first wrote the heuristics. For example, mobile devices and voice-based smart devices demand more context-specific heuristics. But, Nielsen and Molich's principles have stood the test of time and continue to be relevant [14]. For example, on a voice-recognized based user interface, the heuristic "visibility of the system status" continues to be applicable; what changes is how an expert implement it. As new technology

continues to appear, UX experts are still using this methodology by adapting the heuristics with the new technology.

3.4 Mobile application selection

From the previous related study, they randomly selected government mobile applications for study. Which is not a better way of selection. But we done this work on more precise way. We listed total 77 government mobile applications under government and non-government organization, but apps owned by Bangladesh government. Based on their download ratio and user review we listed final 8 government mobile applications. Which are badly suffering usability problem, people are still trying to use those apps to get services but every time they failing. Maximum people still reviewing their usability problem in review section and seeking for solutions. Which indicate that these apps need update on usability pretty soon and they badly need these apps.

Sorted from 77 apps from different category. Sorting have done in three phases-

- Firstly, we listed all apps owned by government.
- In second phase we marked important apps based on user need in this current year.
- finally come up with total 8 apps, which are having usability issues and most important.

Table 3.1 Final 8 mobile applications list owned by Bangladesh government

Category	Application name	Short Form
Finance & Banking	Bangladesh National Portal	A1
	Bangladesh Bank Complaints	A2
	Janata Bank	A3
Payment & tool	NRB Tax calculator	A4
	EkPay	A5
Road & Transport	BRTA Sheba	A6
Education	Muktopaath	A7
Medical	Hospital Finder BD	A8

3.5 Nielsen's 10 Usability Heuristics

Most of the time developer faced a development process problem and they never ensure before product launch that they are on the right page or not. There are many well-known design process available which are widely used in the tech industry for making sure they are following the right way or not. “Jakob Nielsen’s 10 heuristics for user interface design” [6] are one of the must-check usability process while a product is prototyping, wire framing and designing. This study can also conduct after launch any product.

3.6 Pros and cons of Nielsen's 10 Usability Heuristics

Like any suggested method in usability research, there are both pros and cons available in every usability research method. Some main pros and cons are given bellow [4]:

Pros:

- Heuristics can find out the usability problem of a design while the product is in the pre-backed process.
- This process is faster process compare to other process and not expensive to conduct.

Cons:

- Heuristic evaluation depends on the knowledge and expertise of the evaluators. Training the evaluators or hiring external evaluators might increase the time and money required for conducting the evaluation.
- Expert needed for conduct any heuristics evaluation. The expertise of the expert knowledge is more important. Higher and better result depend on better expertise.

Pros are pretty good but if we talk about cons, it also our pros in this study. Because we have sufficient amount of expert in our team and their knowledge is about UX and heuristics is good enough. And lastly, we don't have to spend money on hire expert for conduct this study.

3.7 Overview of Nielsen's 10 Usability Heuristics

Here H1, H2 are short form of 10 principles for heuristics. For example, H1= visibility of system status. Converted listed in the table below. We will use these short form in the evaluation process.

Visibility of system status: The interface should keep informing the user inform that what's happening in every in every action and in every process. So user don't need to confused thinking about what's going on in interface and they can understand the process done successfully or not [16].

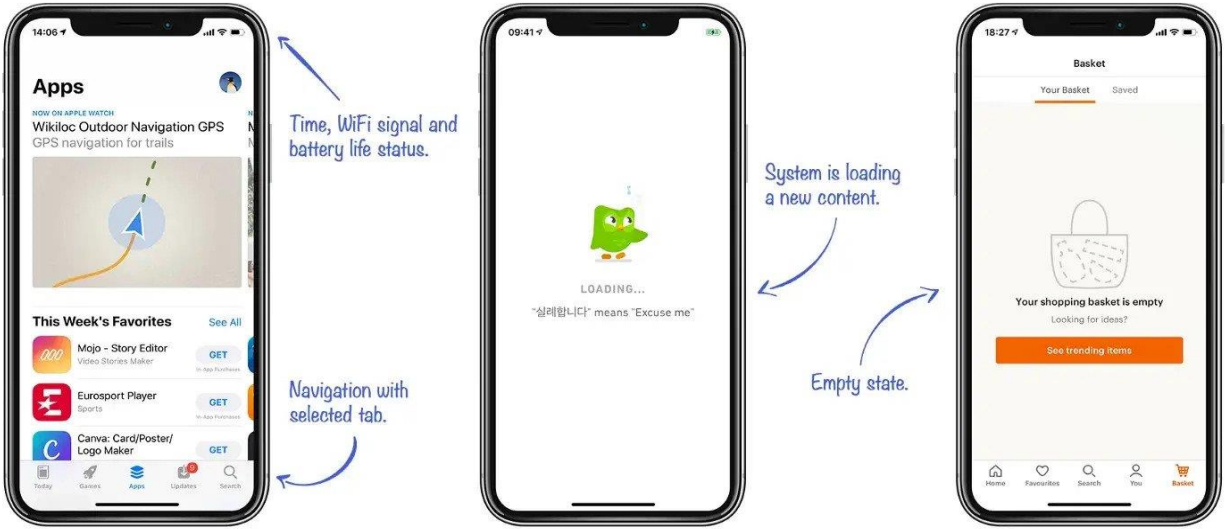


Figure 3.7.1 Visibility of system status [16]

Match between the system and the real world: The design always need to be familiar with the Real word. All the interaction processes should be relevant with the people’s regular interaction. Like inbox icon should show the relevant icon, add button title should be add. If use plus in add button, it will be irrelevant and user will be confused in the interaction process.

While user meet with the process or action they already know, they feel comfortable with the process and they accomplish their goal.



Figure 3.7.2 Match between system and real world [16]

User control and freedom: User most of the time make mistake by go on a wrong way. They do it often and it also normal for them. But they also expect that there will be a way where they will get back in the process or undo. If there is no back option/ undo option/ cancel option, user will be

frustrated and stop using the product. So, there always be an alternative for every critical and normal (depend on the user need) action undo process for user proper control on product.

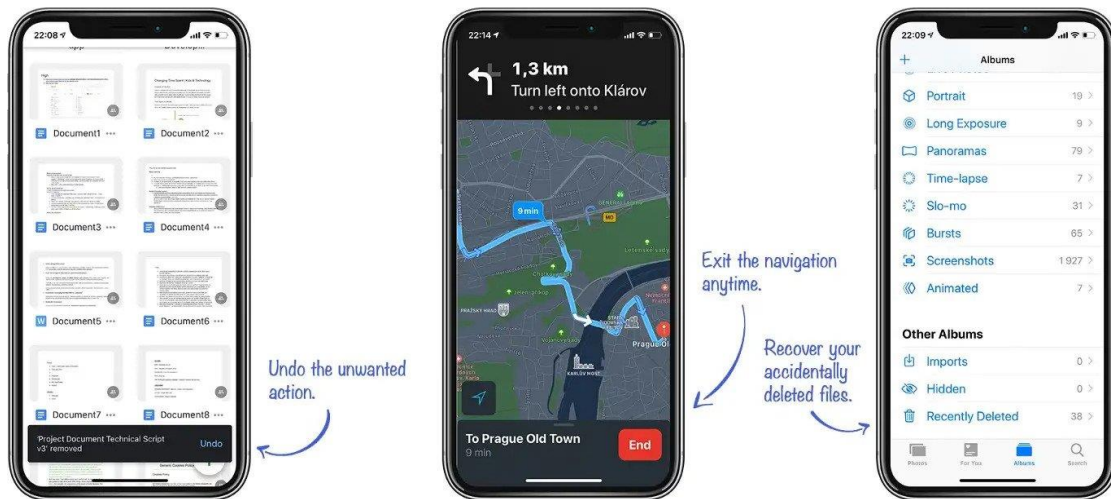


Figure 3.7.3 User control and freedom [16]

Consistency and standards: User should not be confused of the process. Product should not be developed in inconsistent way, where 2-more action mean the same thing. This is inconsistency, which make the user journey more difficult on the way. The Interface should not offer huge feature in one page. It confused the user where to and it violate the consistency. The user expected the action where they already experienced it before. Like an check in process in hotel. Maximum time it available at front. If the check in table move to 2nd floor, the customer will be confused. Which is making it inconsistent.

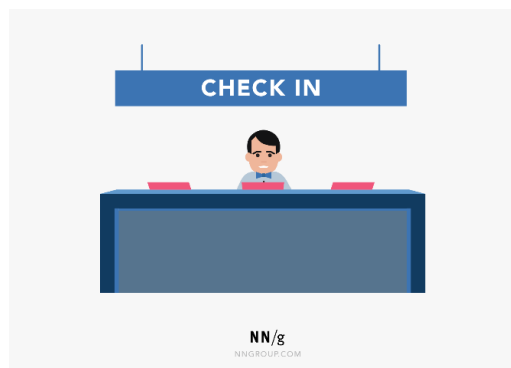


Figure 3.7.4 Consistency and standards [17]

Error prevention: There always be an error risk in every section. So, if designer know that the user can make mistake here or the process is trickier to done. There should be an error prevent message that “the work should be done this way with instruction. [17].

Recognition rather than recall: making memory pressure on user mind is bad. Never ask for a past process question on the go. It will be better provide the previous information to the user, so that they can recognize the information provided previously.[17].

Flexibility and efficiency of use: Use shortcut in the work process will make the user journey more comfortable. It will reduce the work time and also give a better way to work. Like, we use ctrl+c to copy anything. Which is make the low amount of time on the process.[17].

Aesthetic and minimalist design: Interface should not be more gathered with irrelevant information. The interface should be more goal centric and there should be white space in the design. So, user can focused on the goal.[17].

Help users recognize, diagnose, and recover from errors: Error message should be more specific while showing an error to the user. Like, error for an invalid mail should be “mail address is not correct”. The message should not be like “error code 404” , which is not clearly mean the problem. [17].

Help and documentation: The process always show help or texted document while the process need an explain before action. Document not necessary for every action. In relevant step, where document and help needed, there must the document and help for the user. [17].

CHAPTER 4

EXPERIMENTAL RESULTS AND DISCUSSION

4.1 Nielsen's Heuristics and severity

Here H1, H2 are short form of 10 principles for heuristics [6]. For example, H1= visibility of system status. Converted listed in the table below. We will use these short form in the evaluation marking table.

Table 4.1 Nielsen's 10 general principles

Nielsen's 10 general principles for Heuristics evaluation	short Form
1. Visibility of System Status	H1
2. Match between system and the real world	H2
3. User control and freedom	H3
4. Consistency and standards	H4
5. Error prevention	H5
6. Recognition rather than recall	H6
7. Flexibility and efficiency of use	H7
8. Aesthetic and minimalist design	H8
9. Help users recognize, diagnose, and recover from errors	H9
10. Help and documentation	H10

In HE (heuristics evaluation), problems were identified with a severity rating (0 to 4) based on their frequency, impact and persistence. Severity ratings can be used to allocate the most resources to fix the most serious problems and can also provide a rough estimate of the need for additional usability efforts.

The severity of a usability problem is a combination of three factors[4]:

- The frequency with which the problem occurs: Is it common or rare?
- The impact of the problem if it occurs: Will it be easy or difficult for the users to overcome?
- The persistence of the problem: Is it a one-time problem that users can overcome once they know about it or will users repeatedly be bothered by the problem?

Table 4.2 Severity rating

Severity Rating	Description
0	I don't agree that this is a usability problem at all
1	Cosmetic problem only: need not be fixed unless extra time is available on project
2	Minor usability problem: fixing this should be given low priority
3	Major usability problem: important to fix, so should be given high priority
4	Usability catastrophe: imperative to fix this before product can be released

4.2 Problems identify and result

Table 4.5 summarized the average number of problems (violation of the usability guidelines by Nielsen) found with respect to each heuristic for each mobile application. The problems identified under each heuristic are given severity rating (in Table 4.5).

Table 4.3 Heuristics scores for each app

	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	Total
A1	9	8	12	23	4	10	12	19	5	3	105
A2	6	4	5	11	2	3	6	2	5	2	46
A3	4	8	3	13	1	4	7	7	1	1	49
A4	7	5	6	9	6	4	8	3	9	4	61
A5	7	11	8	13	8	3	12	4	7	4	77
A6	5	10	6	22	2	5	5	4	4	3	66
A7	6	2	9	14	7	6	13	12	9	5	83
A8	5	3	11	13	11	4	6	3	9	2	67

The result indicate that all selected apps are suffering good amount of usability problem. We can observe that H4, H7 and H3 violating most in selected apps. These guidelines are mostly overlooked while designing those government applications. H1, H2, H8, H9 are in moderate position but these are also showing high values. But considering with the H4 and H7 holding highest violation values. On the other hand H4 and H10 holding low violation's.

And if we look at the high violation score of applications. We can see that the application A1 (Bangladesh national portal) a national portal of service and information, A5 (ekpay) government billing tool and A7 (muktopaath) a service of education for all, which are significantly violation high rate score. These applications are most important for every citizen of Bangladesh, which are suffering and not taking steps on making them more usable.

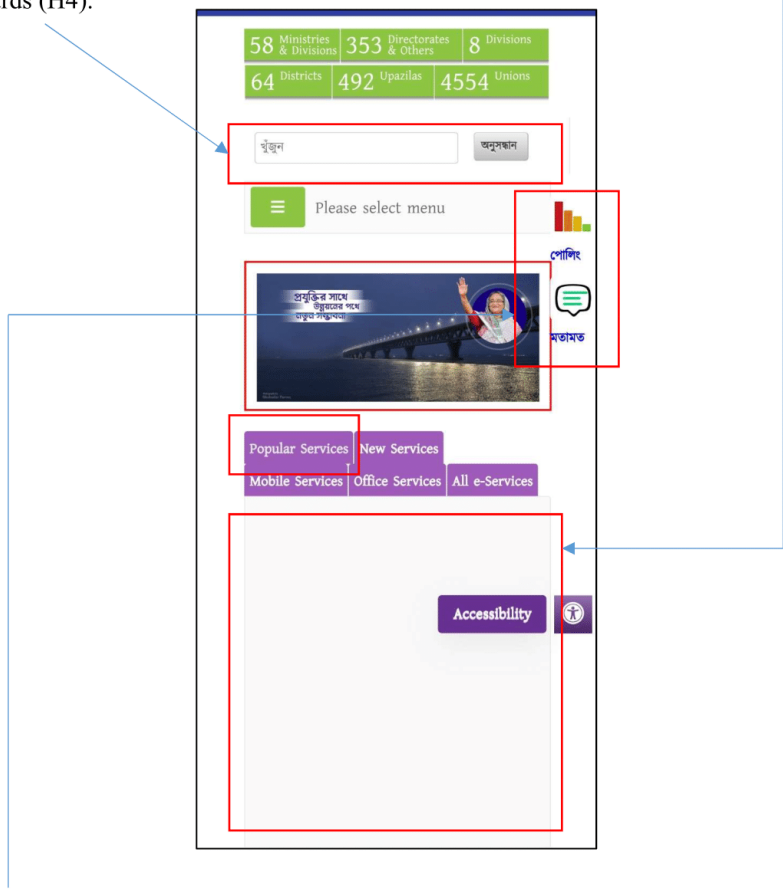
In moderate violation score, the application A4 (NRB tax calculator), A6 (BRTA Sheba), and (Hospital finder bd) A8 are also not far from the high violated applications. These apps are also carrying a critical violation value. Which also need to be looked at carefully for making them usable again.

Findings of heuristics violation at a glance:

In Bangladesh national portal, we encountered huge usability problem. We can see bellow that H1, H2, H4, H8 violation in one interface. This app is integrated with the main website of national portal and this app contains same pages like the website. So we got huge amount of usability problem from this app and most of them are critical.

The search bar input field and button name indicate same thing. Which violate the heuristics (H2) match between system and & consistency and standards (H4).

After clicking on popular services, the interface showing nothing and no message of the system. What's going on! Its violating the (H1). visibility of the system status.



Design is not minimalist and also not consistent. Which are violating the heuristics H4 and H8.

Figure 4.5.1 Heuristics violation partial view of National portal

Here, we can observe a critical violation of heuristic H4 and H2 for BRTA Sheba application. They use unknown icon for login and register option and also the options are aligned with side menu bar which is violate the H4. The color set also inconsistent which is also violating the heuristics H4.

The color set for icons are also not consistent and using red color in icon always not a good choice, while designing a legal service. It's violation the heuristic H4 and H8.

Here the login icon and register icon is violation the heuristics H2, (Match between system and real world). Because this type of login and register icon are not known by the user.



Figure 4.5.2 Heuristics violation partial view of BRTA Sheba

In Bangladesh Bank complain application, the home page is full of usability problem and we encountered many. These usability problems are mainly violation the H2, H4, H5 and H8. If we observe, we can see that there is huge inconsistency in their design and the always overlooked the design standard.

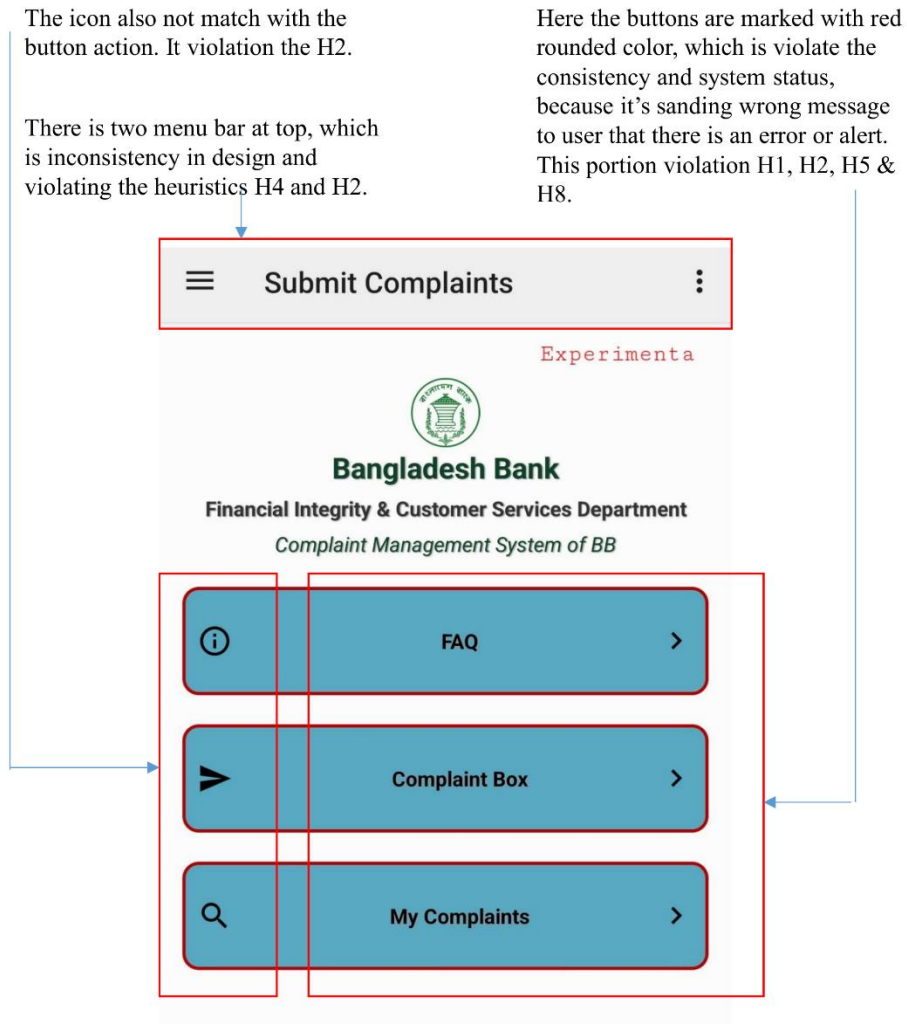


Figure 4.5.3 Heuristics violation partial view of BB Complaints

The percentages figure showing that the government mobile applications are mostly violating heuristics H4, H7 and H3. On the other hand, the Heuristics H1, H2, H6 and H8 are showing moderate high value. Which is also indicate that these problems can't be overlook. But the result saying that developer & designers are mostly violating the consistency and standards while developing mobile apps.

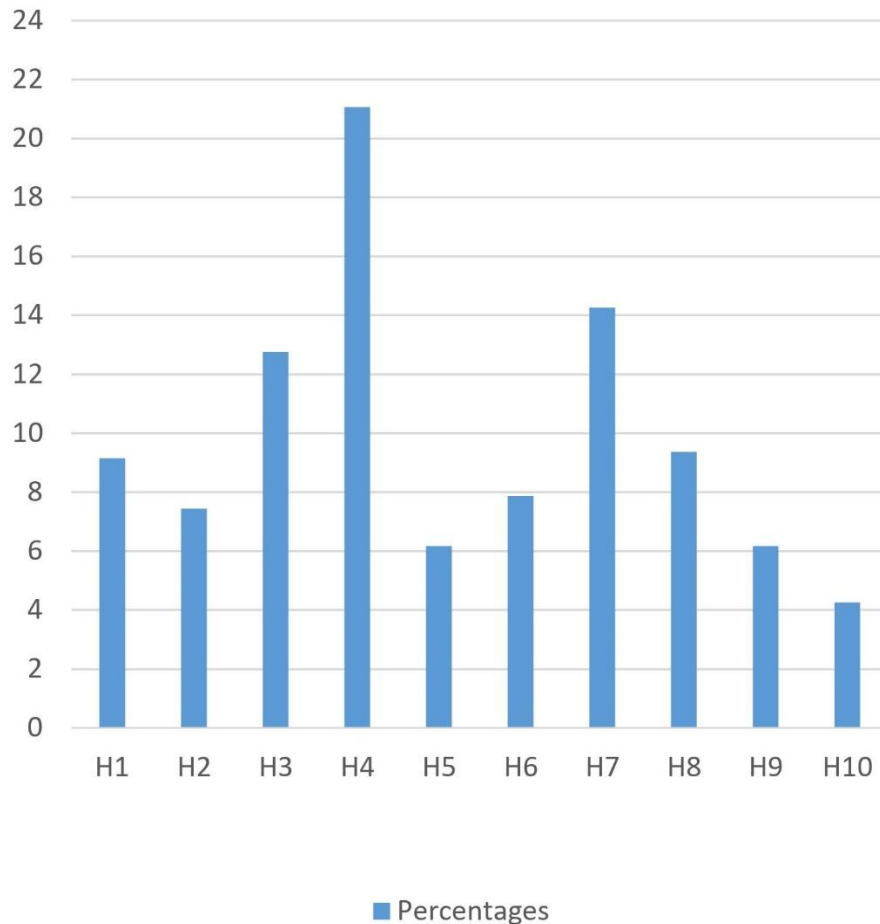


Figure 4.5.6 Percentages of each heuristic

Observing the severity rating, we can come to a point that half of the usability problems (45%) are coming from severity rating 3 (see figure 4.5.7). Severity rating 3 mean the “major usability problem important to fix, should be given high priority” [4]. The severity rating 3 also carrying a huge amount of number, when it comes about usability problem. The overall findings indicate that

the government mobile applications have been designed and developed having significant number of major usability problems which need be fix immediately.

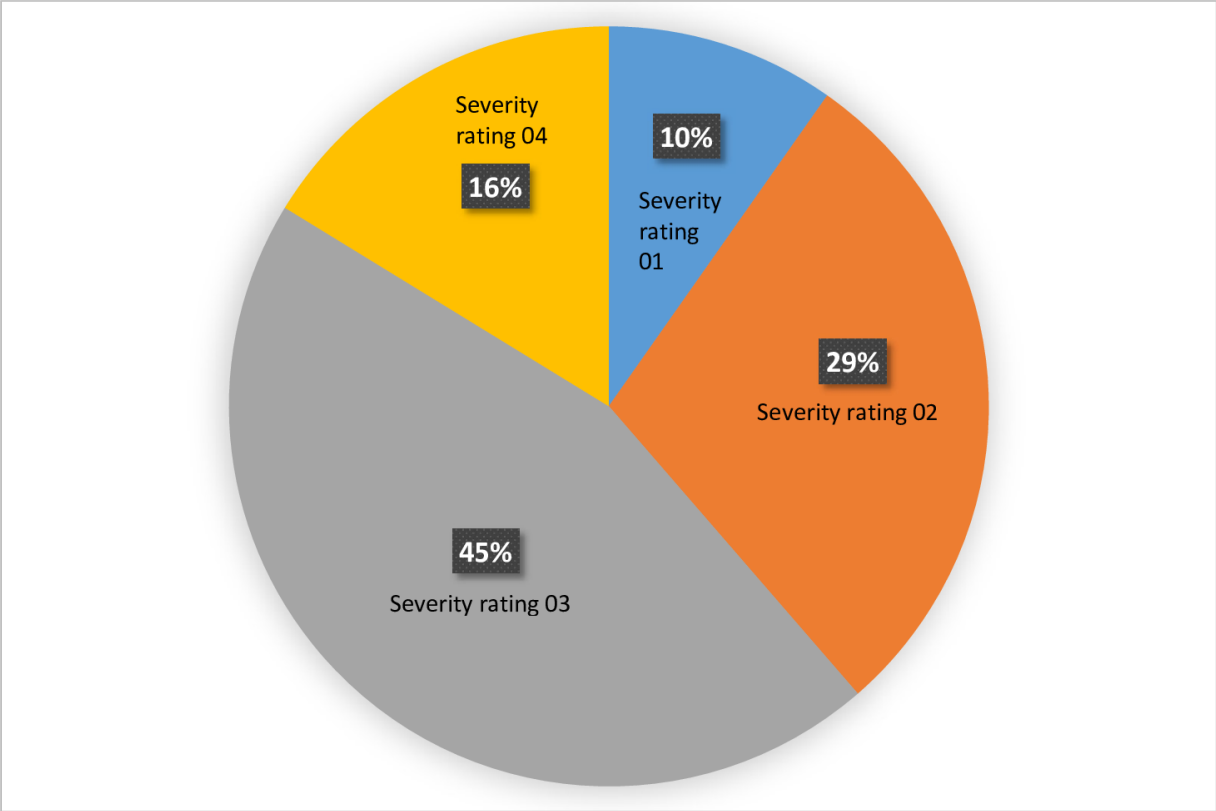


Figure 4.5.7 Severity rating of each heuristic

CHAPTER 5

RESULT COMPARISON AND ANALYSIS

5.1 Comparison and analysis among three works

This study successfully conducted by Nielsen heuristics evolution step by step with proper and precise way. Compare with the other works [10], they found that government website having usability issue by violating H1, H4, H7 and H8 and these issues are carrying high value. On the other hand, our study also come up with considerable similar result that H3, H4, and H7 are the most violated heuristics. Where both study claims that government website and mobile apps are not maintaining the consistency and standards (H4) and flexibility and efficiency of use (H7).

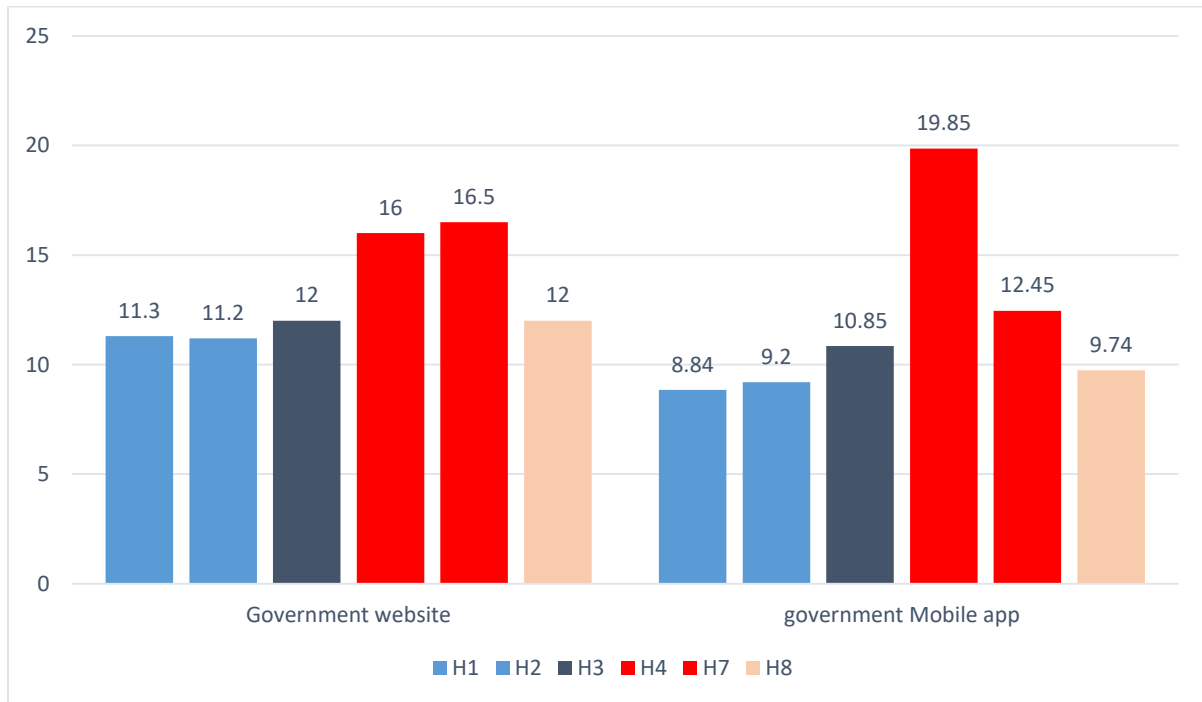


Figure 5.1.1 Result comparison between website and mobile app

Conduct of heuristics evaluation (figure 5.1.1) based on Bangladesh government mobile application/website, we can clearly see that H4 (consistency and standard) and H7 (Flexibility and efficiency of use) violation rate is high. Which ensure that all government mobile app development don't maintain the consistency & standard and Efficiency of use. But the violation rate of H3 (User

control and freedom) is also high, where all government mobile app/website not maintaining the user control standard. Which should be badly needed to maintain for better usability of a website/application. But along with them H8 (Aesthetic and Minimalist design) is not also maintain while developing government mobile application. In every App we found messy user interface which was not minimalist. So the mobile app and website owned by Bangladesh government are in bad condition, which having a huge amount of critical usability issues.

With compare to another work which is significantly good [18]. They conduct heuristic study on 4 truck hiring application of Bangladesh and they got a moderate number of violation score, which can be tolerate based on severity. Compare to these private mobile application, government mobile applications are not developed with well concern. From our study, the violation rate is higher than a private mobile application. If we see in the (figure 5.1.2) we can clearly visualize that the violation rate of private mobile application is low. Where government mobile applications are violation the H4 and H7 in higher rate and the H4 and H7 violation rate is low in private mobile application. So, it's indicate that the governments mobile applications are in bad condition.

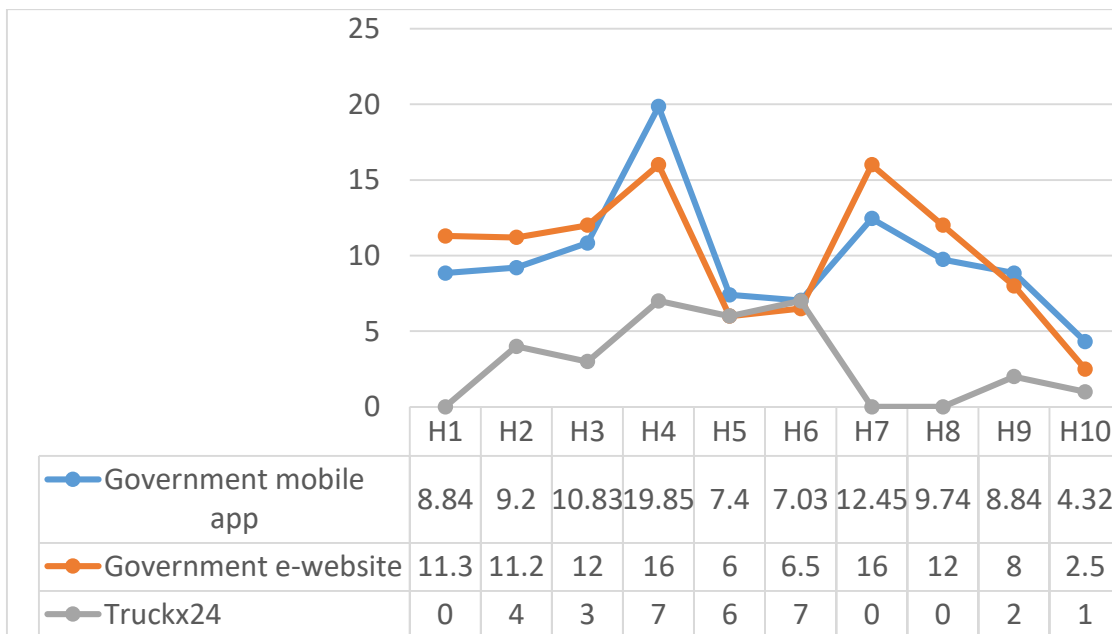


Figure 5.1.2 Result comparison among private and government app/web

And with compare to previous work [9], they worked on few usability evolution and come to the point that most of the government mobile applications are suffering significantly a huge number amount of usability problem. Where our study also agrees with this claim. Where their work [9] is not conduct on specific selected mobile application, they cauterized all app in category like finance, Health and fitness etc. And come up with a combined usability score. Which also claim that the heuristics H4 and H7 is violating most. If we visualize the result of both work (figure 5.1.3), we can see that heuristics H4 and H7 violation rate is high like other works result. Government application development maintaining a bad development process and overlooking a huge amount of usability issue, which they need to focus. Other violations are considerable low. But the number of consistency and standard violation rate is high. Our study showing that (figure) H4 violation score is 19.85% among other 9 heuristics rules violation. Which is significantly high. And this work [9] also showing that the heuristics violation of H4 is also carrying a high violation score which is 12% among all 9 heuristics violation rules.

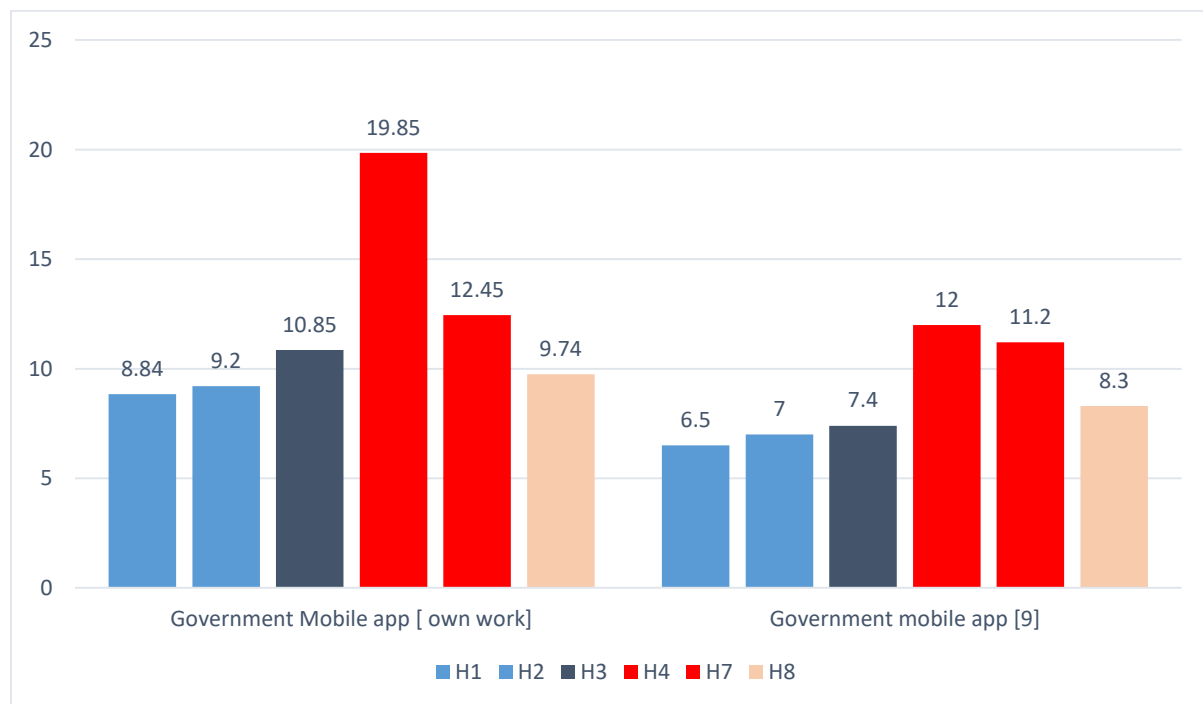


Figure 5.1.3 Result comparison between our work and previous work

Visualizing all these three comparison result, we clearly see that app development in Bangladesh not maintaining the standard and consistency of design. Which creating bad impact on mobile

application using experience. Because of aggressive development process the applications are effected by same kind of problems. They are avoiding / overlooked the usability important section, where they need to focus on. And with the severity level of 45%, which is critical (figure 4.5.7) and these critical problems are carried by the government mobile applications. The heuristics score (figure 4.5.6) also show that other violations may not critical but carrying a huge number of violation. Which prove that government applications are full of usability problem. They can ignore less critical problem those application having. But they should concern about their less critical problems also. Because these problems may effect in near future. Already these applications are full of critical issues. Which need a proper time to time update. On the other hand, the private apps are having very less usability problem with compare to government mobile applications. This study reviles that government mobile applications are not developed with proper guideline which they should need to maintain for produce better usable mobile applications and the issues all these government mobile applications having, most of them are critical. These issues need to fix soon for make these important government mobile application usable again.

CHAPTER 6

CONCLUSION AND FUTURE WORK

6.1 Conclusion

The usability issue having by government mobile application is bigger. Everyone talking about these usability problems of Bangladesh government mobile applications. Electronic media also talking about the usability issues of government mobile application of Bangladesh. They also inspecting the reality of those problems and come up with article with proven usability problem. Their article says the harsh reality of government mobile application usability. They found [8], most of the government mobile applications are out of date, some are crashing while opening, some application doesn't have enough functionalities to get the desire service, some application stop working after opening, some apps are not made with development standard and they tricky to use. They come up a summary that maximum government mobile applications are not user-friendly and not give the expected services. So, our result found those usability problems having by the selected 8 most important unusable mobile applications and describes the proper problem and where developer & designer need to focus on, make the reusable again.

6.2 Future work

Designing user-friendly interface to improve the usability has priority attention of HCI researchers and also by the UX designer. Our aim was find out the mostly need government application needed by the citizen of Bangladesh. Which apps are having critical usability issue. We come up with the overlooked section while designer designing the applications and proven description of critical usability issues which need to fix soon for making them usable again. If the developer concern about the overlooked guideline, they will be able to come up with a better product/ mobile application for citizens. Which will also make value of government for giving all citizen a usable application. In future we want to make a guideline for designer, so they can use don't miss the must check sections, the user centric thought and how to overcame the aggressive development of applications. With the proper checklist the development process issues can be resolve. Maintaining proper guideline can be the result of better product with less issues. Which will also decrease the risk of a failed product and give the user better usability experience.

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