New House Defects Smart Checklist
Based on QLASSIC Standard

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ABSTRAK

Rumah adalah sebuah bangunan yang berfungsi sebagai tempat tinggal untuk satu atau keluarga menurut Merriam Webster yang bermaksud semua orang terutama keluarga memerlukan sebuah rumah yang akan didiami. Sebuah rumah sangat penting untuk sebuah institusi keluarga, rumah yang berkualiti baik tepat. Isu ini bukan sahaja di Malaysia, tetapi ia adalah isu seluruh dunia mengikut United Nations. Rumah berkualiti baik pasti mahal, dan sesetengah orang tidak mampu membeli rumah itu. Ya, ada beberapa rumah mampu milik, tetapi kualitinya kurang dan tidak memenuhi standard. Kemudian, CIDB keluar dengan penyelesaian yang QLASSIC. QLASSIC adalah piawaian kebangsaan untuk industri pembinaan. QLASSIC adalah satu bentuk pendek Sistem Penilaian Kualiti dalam Pembinaan. QLASSIC adalah untuk pembangun dan orang awam yang merupakan pembeli rumah. Pada masa ini, CIDB hanya menyediakan buku panduan kualiti atas talian untuk pemilik rumah yang pemilik rumah boleh memuat turunnya di laman web CIDB. Senarai semak kualiti disediakan dalam buku atas talian dan jika terdapat beberapa kecacatan, pemilik rumah harus membuat laporan manual. Laporan manual termasuk menulis surat rasmi dan hantar ke pejabat pemaju. Oleh itu, tidak ada alat dalam talian untuk pemilik rumah dan tidak ada alat analisis yang menyokong pembuatan keputusan sistemik untuk pemilik rumah. Akibatnya, saya ingin membuat penyelidikan mengenai penilaian dalam talian untuk pemilik rumah. Senarai semak pintar akan mengandungi tujuh atribut, dan, dalam setiap atribut, akan ada beberapa syarat untuk atribut tersebut. Setiap syarat mempunyai satu tanda secara lalai. Oleh itu, markah yang diberikan akan dibahagikan kepada jumlah tanda atribut. Oleh itu, tanda tersebut akan disimpan dalam pangkalan data. Prototaip ini akan dibangunkan menggunakan fungsi Limesurvey yang telah diubah suai dengan pengekod html dan pangkalan data ringkas untuk menyimpan data. Kemudian, saya akan menggunakan Microsoft Excel untuk menganalisis data dan membuat visualisasi data daripadanya. Belum lagi, senarai semak dalam talian ini adalah laporan dalam talian dari pemilik rumah kepada pemaju, Persatuan Rumah dan lain-lain. Akhirnya, hasil yang dijangkakan juga akan memberi manfaat kepada Persatuan Rumah atau mungkin CIDB kerana analisis potensi yang akan keluar dari data ini adalah kecacatan utama berdasarkan projek, dan bahagian yang terbaik adalah corak kecacatan dari masa ke masa berdasarkan projek, pemaju dan rantau. Dengan analisis ini, ramalan dan pencegahan untuk projek seterusnya boleh dibuat. Oleh itu, akan menjimatkan banyak kos dan masa untuk pemaju atau untuk pihak yang berkaitan.

ABSTRACT

House is a building that serves as living quarters for one or a family according to Merriam Webster which means everyone especially family needs a house to be lived in. A house is very important to a family institution, a good quality house to be exact. This issue is not only in Malaysia, but it is worldwide issue according to United Nation. Good quality house is definitely expensive, and some people cannot afford the house. Yes, there are some affordable houses, but the quality is poor and not meet the standard. Then, CIDB came out with solution which is QLASSIC. QLASSIC is a national standard for construction industry. QLASSIC is a short form of Quality Assessment System in Construction. QLASSIC is for both developer and public which is house buyer. Currently, CIDB only provides online quality guide book for homeowners which is home owner can download it on CIDB website. The quality checklist is provided in the online book and if there are some defects, home owner has to make a manual report. A manual report including writing a formal letter and send it to the developer's office. Hence, there is no online tools for home owner and there is no analytical tools supporting systemic decision making for home owner. As a result, I would like to make a research on online online assessment for home owner. The smart checklist will contain seven attributes, and, in each attribute, there will be several conditions for that attributes. Each condition has one mark by default. So, the given mark will then be divided to total mark of the attribute. Hence, those mark will be stored in the database. The prototype will be developed using Limesurvey functionalities that had been modified with html coding and a simple database for storing data. Then, I will use Microsoft Excel to analyze the data and make a data visualization from it. Not to mention, these online checklists is an online report from home owner to developer, House Association etc. Finally, expected result will also benefit to House Association or maybe CIDB as the potential analytics that will come out from these data are major defects based on project, and the best part is the pattern of defects over time based on project, developer and region. With these analytics, prediction and prevention for next project can be made. Hence, will save lots of cost and time for developer or for related party.

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CHAPTER 1

INTRODUCTION

1.1 Overview

This chapter gives a general summary and review of the proposed research in the thesis. Section 1.2 will tell about the complete background for Potential of Data Analysis in Construction Industry, Case Study of QLASSIC Online System. Next, section 1.3 gives a brief description of the problems of the current system. The goal and objectives of this research are stated in section 1.4. Moreover, in section 1.5 will be discussed the scope of the study, the significance of the Construction Quality Assessment is in section 1.6 and thesis organization is in section 1.7.

1.2 Background

A great civilized nation is built based on the good and well-functioning society. In order for the society to well function, a good and affordable house is a requirement. This is because a civilized nation comes from a good society and a good society comes from a good family. One must have a house especially a family. It is a mandatory for family to live in a good house and a good environment.

Affordable house has become a global issue and Malaysia as a developing country also faces this issue (Cheah & Almeida, 2016; Samad, Zainon, Rahim & Lou, 2017; Sani & Rahim, 2012). As Malaysia aiming to become a developed country by the year 2020, it is important for all the stakeholders address and find the most effective solution of that issue as this country population keeps growing and increasing year by year.

Furthermore, many initiatives and residential affordable or low-cost house (Samad et al., 2017) projects has been executed or budgeted to address the issue. Yet, the remaining issue is on the quality (Ismail, Ani, Razak, Tawil & Johar, 2015; Radzuan, Hamdan, Hamid, & Abdullah-Halim, 2011) of the house still becoming a major continuous concern. It is quite surprising that many house buyers do not know what and how to inspect the quality of the new house when they get the key.

Additionally, there are many people may not aware how much is the level of safety the building to live or work in. CIDB comes out with a National Standard for Construction Industry which is QLASSIC. What is QLASSIC actually? QLASSIC is Quality Assessment System in Construction (Izzah, 2017).

The procedure for measuring the construction material is only can be made by a few of authorized people and the sample from the particular building is only randomly chosen. For public, which is house buyer, CIDB comes out with an online quality guide book for homeowners. CIDB publish it on 2017. It is the first edition available online. So, anyone can download it from CIDB website. The title of the book is Quality Guide for Homeowners. There are seven attributes on the checklist including door, wall, ceiling, floor, window, fixture and M&E fittings.

Not to mention, there are several specifications of condition in each attribute. For example, for floor. There are six specification in floor attributes. First, the floor should be even and level and should not be more than 3mm over 1.20m. Second, no hollow sound when tapped on the floor tiles. Third, no paint drips or other stain marks on the floor finishing. Fourth, no cracks, chippings and visible damages on the floor finishing. Fifth, shading and tonality of the floor tiles or timber panels should be. Lastly, jointing between floor tiles or timber floor panels should be consistent.

On the other hand, affordable house is very important in a country. There is some affordable house, but its quality is very low according to Vice President of FOMCA in Harian Metro 2016(Hafiz Ithnin, 2016). The quality issue increases year by year as 2014 there were 340 reports on defects but on 2015 there were 1729 reports on defects(Hafiz Ithnin, 2016). Hence, CIDB came up with solution which is QLASSIC for developer and an online guidebook on quality guide for house buyer.

In fact, by 2020 the QLASSIC standard will be compulsory to all government and private developer in order to produce quality but affordable houses(Abllah, 2019). According to Baru Bian, Ministry of Work, the average rate of QLASSIC score from 2017 till 2018 is increasing from 72% to 74% and this shows the rise of awareness and commitment among developer in construction industry(Abllah, 2019).

Finally, yet importantly, affordable with standard quality houses are one of the Sustainable Development Goals by United Nations Development Programmes. Affordable housing is a key for development and social equality, United Nations says on World Habitat Day. Therefore, it is a global issue.

1.3 Problem Statement

Malaysia Construction Industry Development Board (CIDB) has developed a guide for home owner on what and how to inspect the standard quality of a new house. But the guide is in manual form and can be downloaded on their website. There are many house buyers or public still do not aware about the guide or standard.

I proposed a smart online checklist based on QLASSIC standard for homeowners.

1.4 Objective

1) To review the use of software technology in house defects inspection.

2) To develop web-based prototype to measure the level of public awareness of quality inspection of the new house.

3) To evaluate the functionalities of QLASSIC smart checklist.

1.5 Scope

Objective	Scopes
To review the use of software technology in house defects inspection.	- The software technology used in house defects inspection in Malaysia.
To develop web-based prototype to measure the level of public awareness of quality inspection of the new house.	- The prototype will be hosted on UMP server. - The prototype will be developed using Limesurvey functionalities that had been modified with html coding and a simple database for storing data.
To evaluate the functionalities of QLASSIC smart checklist.	- The expert of this field, Dr. Hidayah will inspect and giving feedback of the functionalities in New House Defects Smart Checklist Based on QLASSIC Standard.

1.6 Significance

- Software technology has been proven can assist people to save more time and be more productive at the same time. New House Defects Smart Checklist Based on QLASSIC Standard is expected to produce the same outcome.

- The concept when it been integrated in big data analytics, more insight can be generated based on the data collected or submitted by the home owner through the New House Defects Smart Checklist Based on QLASSIC Standard.

1.7 Thesis Organization

Chapter 1 contains the background of the study, problem statement, goal and objectives, project scopes, and significance.

Chapter 2 which is the literature view of this research consists of the introduction of existing manual systems, strength and weakness of the system and the comparison between both.

Chapter 3 describes the research design of the thesis. The type of methods or model also described in this chapter.

Chapter 4 is results and discussion, it contains the research framework, and methodology.

Chapter 5 is conclusion, will discuss about the conclusion of this system and future enhancement of this research and prototype. Lastly, the reference will be listing in the reference source.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview

Quality Assessment System in Construction (QLASSIC) is a system or method to measure and evaluate the workmanship quality of a building construction work based on the Construction Industry Standard (CIS 7:2006). QLASSIC enables the quality of workmanship between construction projects to be objectively compared through a scoring system. Quality Assessment System in Construction (QLASSIC) is very important because it is the benchmark for the quality of workmanship in the construction industry. It is also can be used as the criterion to evaluate the performance of contractors based on the quality of workmanship.

Next, QLASSIC is for establishing the quality assessment system on the quality of workmanship in construction work. It also assesses the quality of workmanship of a construction project based on the relevant approved standard. The recent cases of old building cracks and redevelop old building that aged more than 30 years(Povera, 2019a) can be avoided if the QLASSIC assessment is compulsory. As a result of this case, according to Housing and Local Government Minister, Zuraida Kamaruddin, public housing to be inspected every five years to prevent the same unwanted cases(Povera, 2019b).

Moreover, various construction elements of building in construction work are sets out to the standard on quality of workmanship in QLASSIC. If the workmanship complies with the standard, marks will be awarded and then this marks will be summed up to calculate the QLASSIC score in percentage (%)(CIDB, 2016). QLASSIC assessments are carried out through site inspection and use the principles of first-time inspection. Construction works that are rectified after an assessment will not be re-assessed. The objective of this principle is to encourage the contractor to "Do Things Right the First Time and Every Time"(CIDB, 2016).

What is data analysis? Data analysis is a method in which data is collected and organized so that one can derive helpful information from it(Whiting, 2017). In other words, the main purpose of data analysis is to look at what the data is trying to tell us (Brianna Whiting, 2016).

Analytics is the discovery, interpretation, and communication of meaningful patterns in data. It helps in understanding and using available data & information in better way to improve operational efficiency. Analysed data helps in seeing opportunities and challenges in advance. In soaring toward Industry Revolution 4.0, data analysis is very important as prediction and prevention can be made through data visualization.

Hence, for developing country, prevention from defects or problem is crucial as it will decrease the cost and time. But in fact, all country needs to prevent problems or defects as no one, or no country wants problem or defects.

2.2 State of Art

There is no existing system or mobile application for a quality checklist for homeowners based on QLASSIC(Izzah, 2017). Generally, QLASSIC assessment process is only pre-determined sampling, site inspection, one-time assessment and third-party assessment for CIDB side. On the other hand, on behalf industry or developers, they must first apply to CIDB through the application form. Next, if the form is approved then the architectural work, structural work, M&E work, and external work will be included in the scope of assessment. Then, the assessor will be sampling the sample chosen and it will be an on-site assessment. Last but not least, the QLASSIC score will finally be given.

On the other hand, from 1999 to 2009 there are various researchers have stressed the use and development of the IT-based system in architecture for quality assessment. Some of their reasons are the expertise of human will slowly be faded, as human is aging but computer expertise is permanent. In 1999, Rivard et.al suggested a shared conceptual model for building envelope design process, to provide communication between different members of building design team

In 2001, Altunay designed a model selection for interior finishes. In 2004, Halil and Mesut developed an automated building element selection system. The system is responsible for the selection of building elements correctly from a vast number of alternatives in the design process(Z. Halil and B. Mesut, 2004).

Finally, in 2009, Che-Ani presented a model of computer-based automation to determine the quality of housing. The research has mapped the automated monitoring system to check the performance of low and medium cost housing. The study briefed about the transformation of empirical housing data into the integrated software to determine housing quality(Chohan, Affandi, Awad, & Che-ani, 2017).

2.1.1 Limitations of QLASSIC Standard Smart House Classification

Currently, there is only one an online quality guide book for homeowners. The book can be downloaded at the CIDB website(Izzah, 2017). Some homeowners still do not know what and how to check their new house. This book will guide the homeowners to check their new house. There are several attributes that are on the checklist such as, door, wall, ceiling, floor, window, fixture, and M&E fittings. Each attribute contains several specifications of condition that homeowners need to check.

Thus, the invention of New House Defects Smart Checklist Based on QLASSIC Standard will make the process of reporting defects will be less cost and less time. The data that have been saved in the cloud will then be used for making data visualization. Data visualization can help to make decision, prediction, prevention and etc which is great.

Strength	- Make homeowners more sensitive and more aware of their right as a buyer and a consumer. - Less time and less cost consuming compare to the current system. - Can help homeowners to make a decision before buying a house in the future. - The report and data visualization also can be sent to the House Association, developer's company etc.
Weakness	- There might be some bug for the smart checklist. - Maybe some homeowners cannot do the smart checklist as the smart checklist based is online. - Some homeowners might not be able to fill the smart checklist as some of them might not used to smart phone or computer or technology.

2.3 Comparison

Item	Online quality guide book for homeowners	New House Defects Smart Checklist
Anyone can download from the website	/	/
Can be accessed anytime (on smartphone or laptop)	/	/
Automatically send a report after done filling checklist		/
Cost and time effective		/

2.4 Conclusion

This chapter discusses the existing online quality guide book for homeowners and the New House Defects Smart Checklist. Moreover, this chapter review about the software technology used in house inspection. Not to mention, the comparison between the online quality guide book for homeowners and the New House Defects Smart Checklist. Both have the strength and weakness of their own. But, the most beneficial for industry and public is New House Defects Smart Checklist compared to existing online QLASSIC guidebook for homeowners.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter will be discussed the research methodology, research framework in the flowchart, and prototype for the proposed design. Generally, the methodology begins with problem statement, objectives, literature review, design and implementation of the proposed approaches. The prototype in this methodology is only the rough design of the web that will be used in the New House Defects Smart Checklist Based on QLASSIC Standard.

3.2 Research Methodology

The research design will include main activities, objectives, and the flowchart. The research design starts with the current online manual quality guide book for homeowners based on QLASSIC standard. The current online manual quality guide book for homeowners based on QLASSIC standard has no website or even application on the desktop or on mobile. It only uses the online manual book which is anyone can download it on the CIDB websites.

The language that will be used to make a New House Defects Smart Checklist Based on QLASSIC Standard prototype is HTML language modified the existing open source software which is Limesurvey and simple database coding for storing data. There will be several tables which include attributes id, description of the attributes id and mark given in each specification of the condition in the attributes.

Not to mention, the data model will also consist of house owner information such as name, email, and address. Besides that, house information such as the type of house, the price of the house, location using geolocation, and address also will be in the data model. More about house information includes defects (attributes) and developer. In the developer, there will be information such as company name, office phone number, location both geolocation and address and age of the company.

Meanwhile, to measure the level of public awareness of quality inspection of the new house, an online assessment will be used to collect the data. The tool that will be used is the Limesurvey tool. Limesurvey tools is a worldwide open source survey software as a professional SaaS solution or as a self-hosted Community Edition. The data collected will then be visualized to measure the level of public awareness of quality inspection of their new house.

In fact, the sub-attributes of each attributes had been simplified as some of the homeowners will not understand the technical instruction in inspecting the defects(Kiran, 2015). Plus, some of the homeowners will not assess all the instruction in the survey as there are many instructions and collecting data will not be easy(Radh, 2017).

The data that had been collected and saved will be used to create an analytics model. As mentioned above, the analytics model is important to prevent or to predict something using current data. Potential analytics that will come out from this research are major defects, the performance of the developer and the pattern of defects.

More about the potential analytics are major defects analytics will be based on projects, developer and region. For the project, there will two attributes in it which is material and design. Materials such as cement, or sand or etc. are sufficient or not. One can know if the cement is insufficient just by knocking the floor, it will make a sound. The dashboard of the project will show that if the projects have more on materials problem or design problems.

Next, the major defects based on the developer. Whether this particular developer has the same problem with its several projects. The dashboard will show what defects do this developer always faced on. Will it be door or floor, or you name it.

Moreover, the performance of the developer can be shown using the dashboard. The number of defects reports on those developers' project vs developers. The greater number of defects reports received by the developer, the lower the developer's performance and reputation as a future buyer will not trust the lower reputation developer to buy their houses.

Finally, yet importantly, potential analytics on the pattern of defects over time-based on project, region, and developer. The dashboard will show the performance and the pattern of defects vs developers. The pattern of defects such as more defects on the ceiling or what not in most of the developer's project will lead to prevention and solution for the developer to solve their problems.

3.3 Quantitative Approach

QLASSIC has seven different of attributes and each attribute have several sub-attributes. Those seven attributes include floor, wall, door, window, ceiling, fixture, and M&E fittings. In each those attributes, there are several sub-attributes which instructions of is how to assess the defects in the right way. The total of attributes and their sub-attributes is 48 instructions includes technical instructions and non-technical instructions.

3.4 Simplify

As the attributes contain some technical instructions, I believe that some of the homeowners will not understand the technical instructions(Kiran, 2015). So, as the solution, I simplify the attributes to ease the homeowners to fill up the form. Then, as there are too many attributes to be assessed, I simplify it and make it less as I believe that if there are too many questions or instructions, responders(homeowners) will not bother to answer and to assess all the instructions(Radh, 2017). As the assessment checklist still many, I added the function of save and resume later but homeowners have to leave their email.

3.5 Qualitative Approach

The data had been collected from the homeowners which is in this research scope of homeowners are in UMP Gambang, Pahang. The homeowners are staff of UMP Gambang. Data that been collected includes name, address, the defects checklist and the feedback of this prototype and the purpose of this research.

3.6 Software Requirement

The software requirement for this research is the Microsoft Word, Limesurvey and Microsoft Excel. Microsoft Word 2013 was used to create documentation, Limesurvey was used to make a New House Defects Smart Checklist Based on QLASSIC Standard prototype by modifying some of the functions in Limesurvey with html coding and Microsoft Excel was used to analyse the data that had been collected in Limesurvey.

3.7 Hardware Requirement

The hardware requirement for this research was medium processing computing machine. A laptop with Intel i5 CPU processor with the speed of 2.7GHz was used. Other than that, the RAM was 4GB which is enough memory to store and generate the data. The prototype can be viewed in desktop view and mobile view.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter defines methodology used in this research. First, the framework of the research is given. Methodology plays a significant role in research. It is the baseline for referring the development stages in the research. There are discussion of findings and model testing in this chapter. The activities being carried out in this research are formulating a research problem, developing and formalizing hypotheses.

4.2   Discussion of Findings

4.2.1 The public awareness on QLASSIC
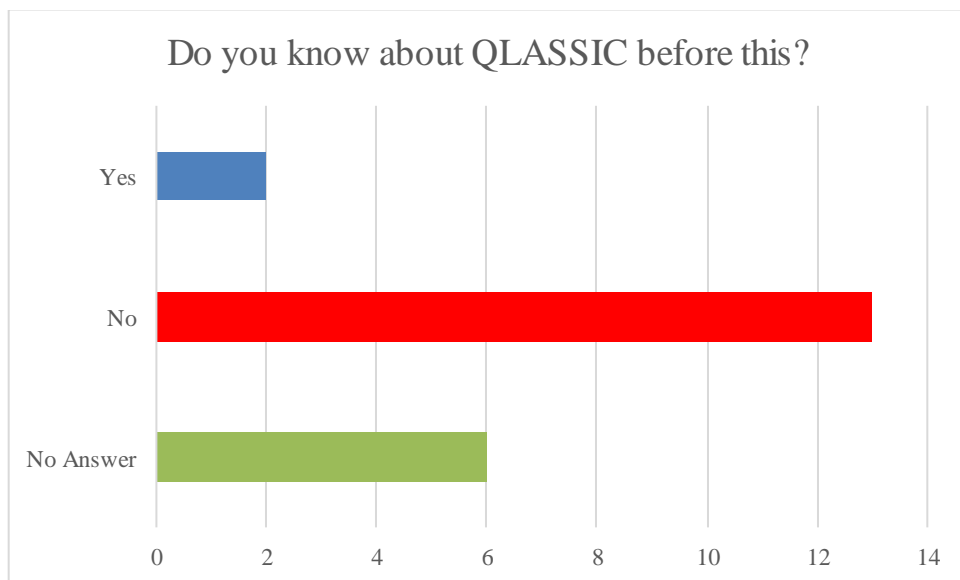
Figure 4.2.1 The knowledge about QLASSIC among public(homeowners)

The clustered bar graph shows that most of the public(homeowners) are not aware about QLASSIC before and with this prototype which is New House Defects Based on QLASSIC Standard helps them to know about QLASSIC, and how to inspect their house

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defects. The scope of data collection is in UMP Gambang only, imagine how many people out there who also do not know about this. If this prototype turns into real system then it can help several parties includes public, developer, government and private sector. There is no answer bar because of some homeowners did not answer the question.
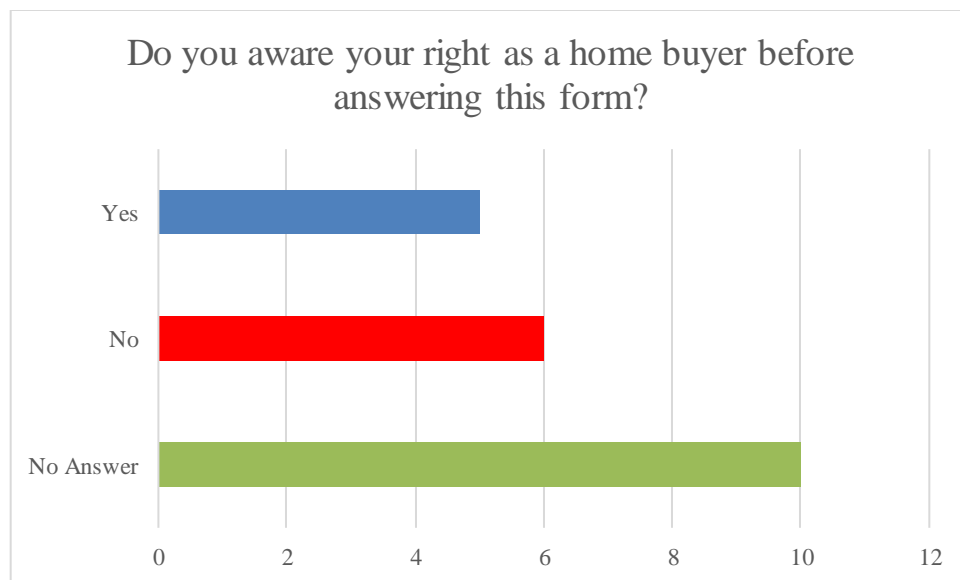
Figure 4.2.2 The awareness of home buyer's right among public(homeowners)

The clustered bar graph shows that some of the homeowners do not know about their right as a home owner. The longest bar is the "No Answer" bar because of this question is in the last section of the survey. Many homeowners do not finish the survey since they have to assess the defects attribute first and to do that will take a lot of time. The survey has save and resume later function so that homeowners can take their time to assess the defects attribute. As the warranty or duration to report house defects is one year(KPKT, 2018).
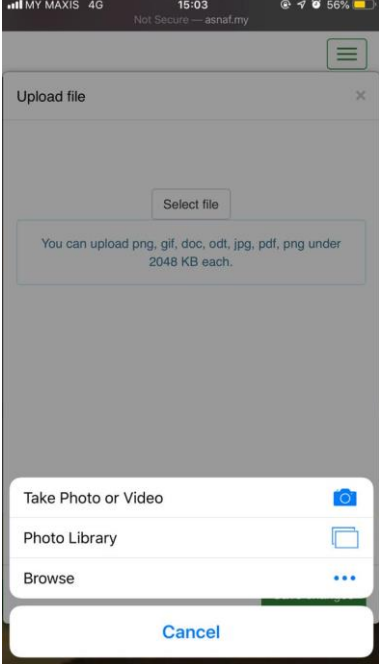
Does this checklist helpful?
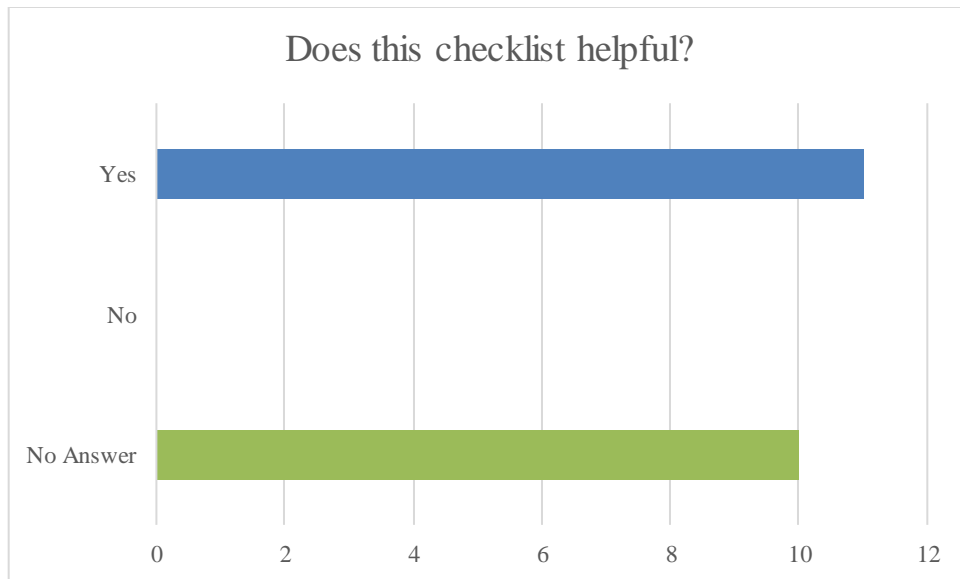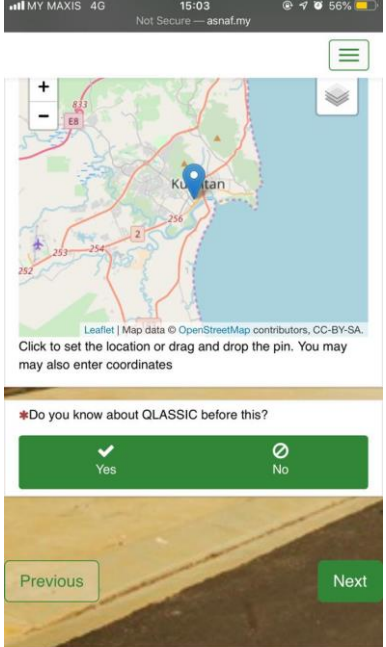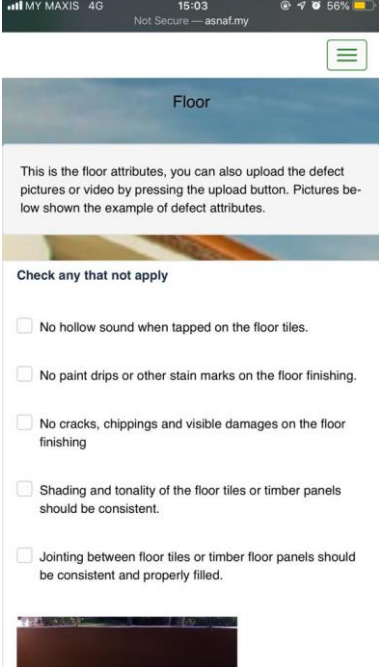
Figure 4.2.3 The feedback of the prototype among the public(homeowners)

According to the clustered bar graph, many has answered "Yes" for the helpfulness of the checklist means that homeowners are accepting this prototype. For the "No Answer" bar is because of this question is on the last section of the survey. So, many homeowners do not finish this survey because of the assessment that they have to assess. Some homeowners found that this smart checklist helpful because they do not have to download any application and they can even save and resume later. There is a year limit to assess all the defects in their house(KPKT, 2018).

4.3 Prototype Testing

Prototype is made of using Limesurvey functionalities and HTML coding and simple database to store collected data.

	1) Limesurvey is open source software("LimeSurvey," n.d.) and the functionalities can be modified using HTML and CSS coding. 2) Open source software has no limitations in collecting data unlike the private source software that you have to pay first before using any premium features(Saltis, 2018).
	1) I chose the open street map for address in form of geolocation. Open street map is also open source software(McDonough, 2013). 2) The data had been collected from open street map can be used without paying any penny because it is open source software compared to Google Maps which is closed source software(McDonough, 2013)

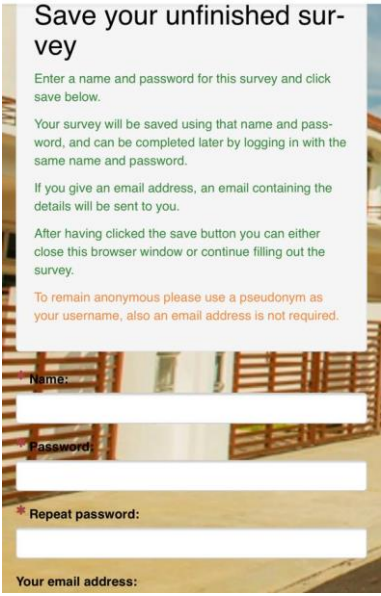|	
	1) The description above describe that homeowners can upload image or video of the defects. 2) For the attribute defects checklist, I chose the checkbox. Homeowners just have to tick which sub-attributes that did not compliance in the checklist. 3) A several image of example on some of the attribute defects.
	1) Direct access camera in mobile phone for homeowners to snap an image or to record a video of the defects. 2) Homeowners can also choose an image in their gallery or photo library.

	1) This is the save and resume later function. Homeowners just have to leave their email. But if homeowners want to stay as anonymous, they can make a username and password to resume the survey later.
	1) This is the end page after homeowners click the submit button. 2) Homeowners can print their assessment.

Table 4.3.1 The interface and description about the prototype

CHAPTER 5

CONCLUSION

5.1 Introduction

In this chapter is the conclusion of the research of New House Defects Smart Checklist Based on QLASSIC Standard.

5.2 Conclusion

Overall this study has achieved the objectives and it is proven that New House Defects Smart Checklist Based on QLASSIC Standard prototype is helpful for homeowners. Moreover, this smart checklist can help to educate some of homeowners in inspecting their houses and their right after own a house.

5.3 Research Constraint

The time for collecting the data is short and some of the houseowners not finish the survey because the survey has a year time limit. Time limit of the assessment survey is based on the warranty of the house which is only one year(KPKT, 2018). Houseowners can answer or assess them whenever they want and can resume later.

5.4 Future Work

This research was done in proving the acceptance of public(homeowners) of this New House Defects Smart Checklist Based on QLASSIC Standard. There are many uses of data analytics from the data collected from public if this prototype can be a real system and its functionalities can be added or improved.

For collecting data, it can be expanded to wider scale covering nationwide instead of currently only collecting data from Kuantan and Gambang area. Moreover, the prototype also can assess old building such as old residential area or public buildings include school, public mosque, public hall or hospital. These data can lead to big data analysis and many data visualization can derived from it.

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Gantt Chart

ID	Task Name	Start	Finish	Duration
1	PROJECT INTRODUCTION	2/11/2019	2/28/2019	14d
2	Identify problem statement, objectives, scopes	2/11/2019	2/22/2019	10d
3	Meeting with supervisor	3/5/2019	3/22/2019	14d
4	Submit Chapter 1	3/25/2019	3/28/2019	4d
5	REVIEW LITERATURE WORK	3/29/2019	4/5/2019	6d
6	Review Literature	3/29/2019	4/15/2019	12d
7	Finding Additional Information and Knowledge	4/1/2019	4/15/2019	11d
8	Meeting with supervisor	4/8/2019	4/8/2019	1d
9	Submit Chapter 2	4/10/2019	4/11/2019	2d
10	METHODOLOGY	4/11/2019	4/19/2019	7d
11	Meeting with supervisor	4/12/2019	4/12/2019	1d
12	Design method/framework	4/12/2019	4/26/2019	11d
13	Submit Chapter 3	4/29/2019	4/29/2019	1d
14	Meeting with supervisor	4/29/2019	4/29/2019	1d
15	RESULTS AND DISCUSSION	3/11/2019	5/2/2019	39d
16	Analyze Data Collection	4/24/2019	5/2/2019	7d
17	PREPARATION AND PRESENTATION FYP2	4/22/2019	5/10/2019	15d
18	Present FYP2	5/8/2019	5/9/2019	2d