

# DEVELOPMENT FRAMEWORK OF QCLASSIC TO IMPROVE DEFECTS IDENTIFICATION IN RESIDENTIAL PROJECT

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## DEDICATION

Every challenging work needs self-efforts as well as guidance of elders especially those who were very close to our heart.

*My humble effort to dedicate to my sweet and loving family member:*

**Subramaniam Govindan**

**Parvathy Shanmugam**

**Saran raj Subramaniam**

**Goppinath Manivelu**

Whose affection, love, encouragement and pray of day and night make me able to get such success and honour,

Along with all hard working and respected,

**AP.TS DR. Roshartini Binti Omar**

**TS. DR. Norliana Binti Sarpin**

Thank for all the supports

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## ABSTRACT

Defects in residential projects have been highlighted by buyers and quality control departments for many years. Defects in construction project are occurred due to many reasons. Thus, construction quality assessment is implemented in residential projects to ensure the project is built to satisfying quality and safe for its occupants. Quality Assessment System in Construction (QLASSIC) is intended as measurement system on workmanship quality in a construction project. The evaluation will be based on Construction Industry Standard (CIS 7:2006) where the workmanship quality in a construction project is evaluated and the end product is called as scoring system. However, the quality of QLASSIC evaluation has started to be questioned by buyers due to the increasing defects in residential projects. Therefore, this study being carried out to explore on the issue. The study consisted of three main objectives; to identify type of defects occurring in QLASSIC implemented residential project, to investigate the limitations of QLASSIC on defects in residential projects and to develop framework of QLASSIC on defects in residential projects. This study conducted with Malaysia private residential developers whom won QLASSIC Achievement Awards from year of 2015 to 2019. 7 developers' companies involved. This research orientated qualitative method and interview question being used as research instrument with 35 respondents. Data was analysed by using NVivo 12 Plus software. Based on the data analysis, a framework has been developed to improve defects identification in residential project. Indicators in framework has divided into four elements. Those are management, technology, material/ equipment and content. Under management there are two improvements. Those are increase quality of training for CIDB assessors and inspection on workmanship. Under technology element, usage of laser scanning, embedded sensor and ultrasonic inclusions are steps toward improvement. Evaluation on material consider as an improvement under material and equipment. Apart from that, improvement also has been proposed under content of QLASSIC. Those are evaluation on soil work, extension on inspection, document submission on design and redo rectification. Therefore, based on the results, all parties including CIDB, residential developer and contractors should take this issue seriously and make efforts in the issue as it is considered important strategy to reduce defects in residential projects.

## ABSTRAK

Kecacatan dalam projek kediaman sentiasa diperhatikan oleh pembeli dan jabatan kawalan kualiti kualiti sejak sekian lama. Kecacatan dalam projek pembinaan berlaku akibat pelbagai punca. Oleh itu, pelaksanaan penilaian kualiti pembinaan dalam projek kediaman adalah untuk memastikan projek tersebut dibina dengan berkualiti dan selamat untuk digunakan oleh pembeli. QLASSIC adalah sistem atau kaedah untuk mengukur dan menilai kualiti mutu kerja pembinaan bangunan berdasarkan Standard Industri Pembinaan (CIS 7: 2006). QLASSIC membolehkan kualiti kerja antara projek pembinaan dibandingkan secara objektif melalui sistem pemarkahan. Namun, kualiti penilaian QLASSIC mula dipersoalkan oleh pembeli kerana peningkatan jumlah kecacatan pada projek kediaman. Oleh itu, kajian ini dijalankan untuk meneroka isu tersebut. Kajian ini terdiri daripada tiga objektif utama; untuk mengenali jenis kecacatan di projek kediaman, untuk menyelidiki batasan penilaian kualiti pembinaan dan untuk membina kerangka penilaian kualiti pembinaan untuk mengurangkan kecacatan dalam projek kediaman. Kajian ini dilakukan ke atas pemaju kediaman swasta Malaysia yang memenangi Anugerah Pencapaian QLASSIC dari tahun 2015 hingga 2019. Ia melibatkan 35 responden dari 7 syarikat pemaju pembinaan yang berbeza. Penyelidikan ini menggunakan kaedah kualitatif dan temu bual digunakan sebagai instrumen kajian. Data dianalisis dengan menggunakan perisian NVivo 12 Plus. Berdasarkan hasil kajian ini, terdapat beberapa kriteria dalam penilaian kualiti pembinaan semasa yang harus disertakan. Kriteria tersebut dibahagikan kepada empat komponen. Iaitu pengurusan, teknologi, bahan/peralatan dan kandungan QLASSIC. Menambahkan kualiti kursus penilai CIDB dan pemeriksaan ke atas mutu kerja dikategorikan di bawah pengurusan. Di bawah kategori teknologi penggunaan pengimbasan laser, sensor terbenam dan ultrasonic disertakan sebagai penambahkan. Penilaian atas bahan dan peralatan dikategorikan di bawah bahan dan peralatan. Selain itu, penambahbaikan juga telah dicadangkan di bawah kandungan QLASSIC. Iaitu penilaian terhadap kerja tanah, lanjutan pada pemeriksaan, penyerahan dokumen mengenai reka bentuk dan pembetulan semula. Oleh itu, berdasarkan hasilnya, pihak CIDB, pemaju kediaman dan kontraktor harus berusaha untuk menangani masalah ini kerana ia dianggap sebagai strategi penting untuk mengurangkan jumlah kecacatan dalam projek pembinaan.

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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Introduction**

Malaysia registered a great economies history, with an impressive track record of growth (Hang, 2016). The Malaysian construction industry tremendously grew from 2016 to 2019, fueled by large-scale construction projects funded by the government's tenth Malaysia Plan (2011–2015). Customers' perceptions of Malaysia construction projects are improving as the building industry grows. In this instance, the customer is fully aware on the significance of the result. However, there are still many prevailing cases of poor workmanship (Ali, 2016). Cases include collapsed townhouses concrete floors (Chew, 2015), the collapsed roof of a new school (Heng, 2017), compensation suits against building developers, as well as structural defects in a recently constructed hospital (Roca, 2015). Based on the reported defects received by National Buyer association, it can be concluded that Malaysia construction industry is having major issue in completed projects. The major issue that owners facing is defects in their new unit (Malara, 2020).

In this regard, Malaysia building developers have begun to incorporate quality assessment into their projects to improve their work quality. The Construction Quality Assessment System (CONQUAS) was designed in 1989 by the Singapore Building and Construction Authority (BCA) in collaboration with other industry technical bodies leaders and

organizations. CONQUAS has had a positive effect on Malaysian construction since its creation (Salahuddin, 2020). As a result, CIDB established the Quality Assessment System in Construction (QLASSIC) under the Construction Industry Standard's guidance (CIS 7:2006). In Malaysia, QLASSIC was created to allow for impartial comparison of workmanship between construction projects using a scoring system (CIDB, 2019). CONQUAS provided guidelines for the creation of this evaluation. The QLASSIC score is used as a quality objective to represent the overall quality success of a building project, to benchmark performance of comparable project scopes, and reflect the efficacy of the built quality control framework (Anuar, 2014).

To increase the degree of quality in construction, QLASSIC serves as a measurable method for quantifying the quality requirements in building construction and promoting the systematic assessment of quality levels under a defined time and expense cap (Amith, 2015). Every job that satisfies the set requirement and guidelines is provided with a quality assessment to test various viewpoints of constructing works and giving more emphasis on standard and guidelines. The quality assessment value for structure ventures is determined by the number of absolute focuses achieved, reflecting the project's design (Irshad, 2020).

The aim of developers using QLASSIC in their projects is to ensure that the project they hand over to the customer is of good quality, has minimal defects, and meets the client's satisfaction standard. However, it has been proven that the majority of Malaysian ventures do not meet consumer satisfaction standards owing to project defects (Draai, 2021). Contractors are often forced to rework parts of the project due to bad construction. Even the same contractor who was hired to fix the defects was unable to resolve the issue. Thus, this research was carried out to investigate the limitation in QLASSIC. Improvements on QLASSIC will improve the overall quality of construction project.

## **1.2 Background of Research**

A construction fault is described as the failure of a building part to be installed properly. Furthermore, defects in a building that are visible to fair observation, such as a roof leak or a base break, are examined (Cherng, 2019). Meanwhile, latent defects are those that are obscured or hidden and will not be detected during inspection. According to Aliyu (2020), defects in Malaysian residential projects continuously fail to meet client expectations, with the majority of buildings experiencing defects as a result of inadequate construction materials and defective architecture. If new house, as according to Hang (2016), is badly built, the new customers are

constantly be grouching about their apartments. According to previous studies, deficiencies in building projects were caused by inadequate workmanship, poor materials, and a lack of foresight. Defects are characterised as failures in the operation and output of a structure. According to Razak (2016), defects are characterised by the errors in building part. Defects are reappearing and reoccurring in Malaysia, despite the fact that the house has been rectified by the same contractor. To overcome the defect problems in Malaysia, managers should focus on building parts, material collection, and quality workmanship (Suffian, 2016).

Aside from all of the solutions, several experts recommend using quality assessment as the safest method (Ali, 2016). The Malaysian construction industry established quality assessment inspect the quality of work done in a development project (BCA, 2000). Quality assessment is a method of ensuring contractor quality during both pre-construction and post-construction stages. Malaysia developed the Construction Industry Standard (CIS 7:2006) on QLASSIC in November 2006. This construction evaluation seeks to determine the construction industry's quality level and provide a common quality assessment scheme as a guideline for construction job quality. To reduce the consistency of defects, QLASSIC was implemented in building projects. However, this assessment was unable to address the problem of a large number of defects in a residential project (Jarosław, 2020). As a consequence, this research was carried out to investigate the limitation of QLASSIC in assisting defects rectification within on residential project. Improvisations on this assessment will help contractors to build projects with less defects.

### **1.3 Problem Statement**

The ISO 9000 series called as standard design is to properly document quality system aspects. This standard created for all the industry and may be applied to any type and size organization. This quality standard significantly impacted the Malaysian construction industry, prompting Malaysia to develop QLASSIC in 2006. During the QLASSIC inspection segment, inspections will be performed on chosen components before and after the job is done. A specific weightage will be established to conduct assessment based on the sampling procedure. The inspector will provide a score based on the quality of craftsmanship after the inspection (CIDB, 2013). Clients and investors can determine the quality status of a building project based on this score. As indicated in the National Housing Policy 2.0, the ministry has reiterated its commitment to make Quality Assessment System in Construction (QLASSIC) accreditation mandatory for all

new constructions by 2020. The primary priority of QLASSIC is to assess workmanship and churn a higher quality product that meets the approved benchmark (Hang, 2016). However, even after the introduction of QLASSIC, defect issues in residential projects continue to arise.

QLASSIC report released by CIDB on 2018, it has been shows, the distribution project assessed by QLASSIC are residential is 77% and 23% for non-residential. This shows that the QLASSIC is highly implemented in residential project compare to non-residential. However, the quality of residential development lacking as defects in the residential project are high. Table 1.0 shows the number of residential construction defects related court cases appeal. According to the statistic on construction residential defects related cases appeal in court, it is proven that defects in residential are kept increasing year by years.

Table 1.0: The number of cases construction residential defects related cases appeal at courts (CIDB, 2020).

Year	Number of cases
2015	258
2016	377
2017	726
2018	687
2019	754

According to the Malaysian National House Buyers Association, 65% of clients are dissatisfied with the state of their new units from defects effecting the overall quality (Curtis, 2018). Many unsatisfied complaints were received from house owner due to their newly purchased unit having defects (Chang, 2018). To address defect to a new property. In that case, the housing developer is required to give a defect liability period (DLP) for repair work under the statutory Sale and Purchase Agreement (SPA). In this circumstance, over the last five years, the Ministry of Housing and Local Government has received between 2,400 and 4,500 complaints on faults (Ahmad, 2018).

According to Housing and Local Government Minister Datuk Seri Abdul Rahman Dahlan, the instances concerned technical allegations. This demonstrated that, despite using quality assessment in residential projects, the defects received by developers during the defect liability period could not be controlled for several years. Architectural (63 %), mechanical (19

%), electrical (15 %), and civil (3 %) defect complaints have been received in Malaysia (Suffian, 2016).

In this scenario, performance level of QLASSIC was questioned by buyers due to high defects level in their new units which was implemented QLASSIC during the evaluation process. Each and every year, the level of satisfaction among users of QLASSIC are keep decreases. Lack of assessor knowledge and staff support are two variables that affect user satisfaction (CIDB, 2019). Lack of assessor expertise refers to workers lack of knowledge and skills in conducting evaluations. According to Datuk Elias Ismail, deputy chief executive of the Construction Industry Development Board (CIDB) Malaysia, they still need manpower and high-level knowledge staff to conduct inspections. As a result, they are hiring new assessors and increasing training with the hopes of being able to provide a complete assessment in two years (Heng, 2017). According to Hong (2018), the evaluation by appointed assessors is less closely supervised by CIDB in QLASSIC. Assessors are expected to attend a course during their initial training time (Aibinu, 2021). However, after the training phase, there is no review or assessment of assessors. Quality assessors with less capability and competency can lead to an adverse assessment of a construction project. This limitations are consider as effect the performance level of QLASSIC.

Thus, this research conducted to investigate the find out what type of defects occur in QLASSIC implemented residential project and identify the limitation of QLASSIC on defects in residential projects. As a result of this research, a framework on QLASSIC was proposed to improve defects identification in residential projects.

#### **1.4 Research Question**

Based on the research statement, there are few of research questions had been established;

- I. What are the types of defects occurring in QLASSIC implemented residential project?
- II. What are the limitations of QLASSIC on defects in residential projects?
- III. How is the framework of QLASSIC improve defects identification in residential project?

## 1.5 Research Objective

- I. To identify type of defects occurring in QLASSIC implemented residential project
- II. To investigate the limitations of QLASSIC on defects in residential projects
- III. To develop framework of QLASSIC to improve defects identification in residential project

## 1.6 Significant of Research

This research is significant since it is one of the inputs and information sources for quality assessment, which is mainly concerned with QLASSIC and defects. A growing number of defects will have an impact on client satisfaction with residential construction. In this regard, the goal of this research is to identify QLASSIC's limitations and to develop a framework for handling defect problems in building projects. This research could be used as guidance in the future. This research could help a lot of people. Parties;

### 1) Contractor

The contractor will have the opportunity to learn about the current condition of defects in residential projects as well as the level of client satisfaction. This study will educate contractors on the significance of QLASSIC.

### 2) Housing and Local Government Department

The National House Buying Association has received thousands of complaints from homebuyers who are concerned about the condition of their new homes (Loong, 2016). This study will serve as a guide for the ministry in determining the root causes of property management problems and devising effective solutions to avoid problems in each case. Investigation of fundamental causes may improve construction performance and serve as a preventative measure throughout the building phase.

### 3) Client

According to Study Report SR348 New House Owner's Satisfaction Survey (Curtis, 2018), the majority of customers are not satisfied with their new home because of several flaws. Aside from that, Agyekum (2016) stated that most clients are still unaware of the significance of

quality in their homes. Clients will discover the value of a quality assessment score when selecting a property as a result of this study.

#### 4) CIDB

CIDB will have the opportunity to understand limitation in QLASSIC which facing by users. This research also suggests CIDB to improve the performance level of QLASSIC by adding proposed indicator.

### 1.7 Research Scope

According to Building Research Establishment (2018), residential projects are highlighted as projects that receive a high number of defects in a construction project. The distribution of defects by building type is represented in Figure 1.1. This figure picturized residential projects receive the highest amount of defect reports compared to other types of buildings. Residential buildings earned over 45%, followed by office and public buildings (20%), education, shops, and commercial businesses (10%).

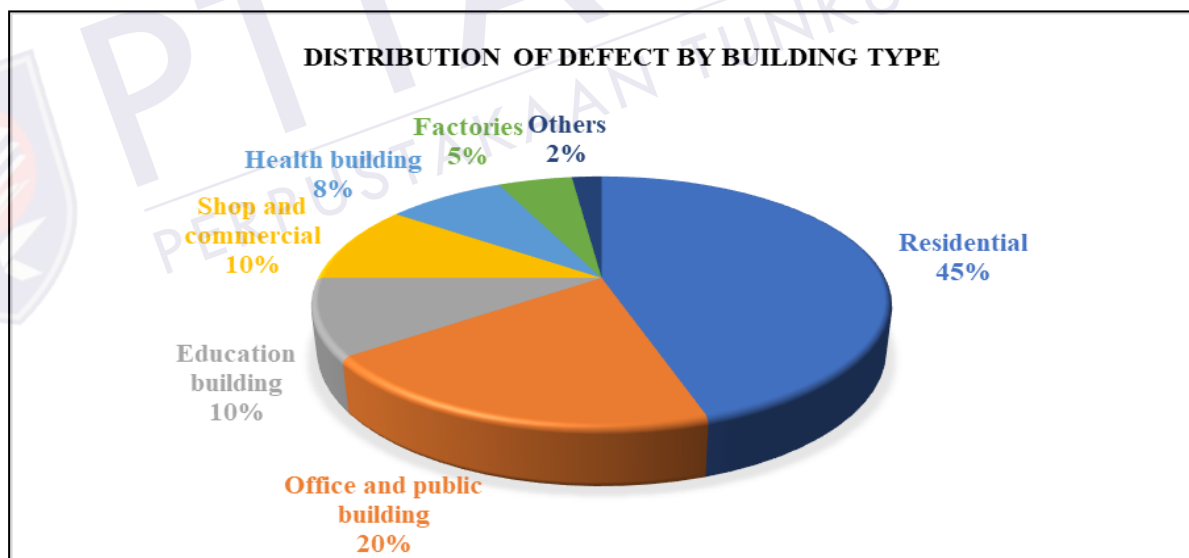


Figure 1.1: Distribution of defect by building type  
(Building Research Establishment, 2018)

Residential constructions are at the top with the most defects, followed by offices and public buildings and educational structures based on research done by Building Research Establishment. Residential projects were primarily developed by the private sector (72%),

followed by the public sector (28%). As a result, private developers are responsible for more than half of all residential projects. Thus, this research scope will approach on private residential projects to discuss on reducing defect

Objective of this research is to investigate the limitation of QLASSIC in defect. Thus, the scope can only be highlighting on respondents who works with QLASSIC and are experienced in residential projects. Thus, respondent of this research are Malaysia's private residential developers who won QLASSIC Achievement Awards from year of 2015 until 2019.

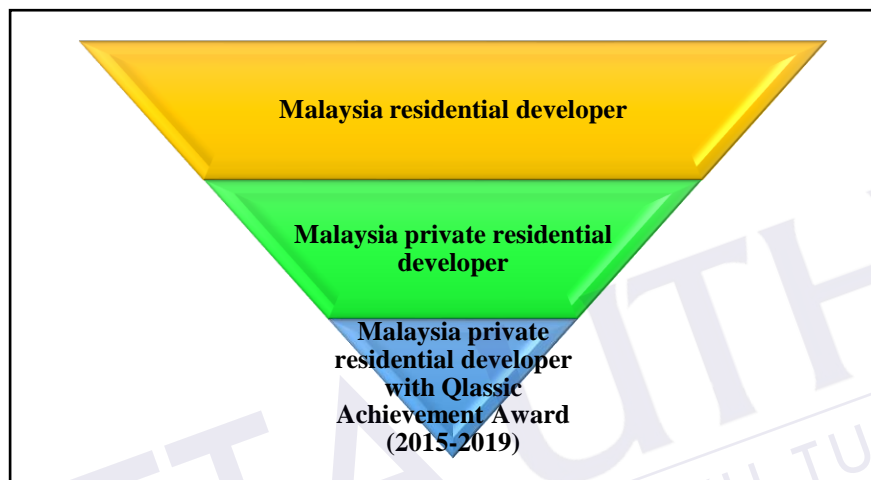


Figure 1. 3: Research scope

This award is established by CIDB and will reward the developers who implemented QLASSIC in their project and achieve best QLASSIC award. These particular developers have more experience and knowledge in the implementation of QLASSIC in residential project. The reason to choose award winners as respondents is because, they have accomplished requirement of QLASSIC in high performing level compare to other developers. Figure 1.3 illustrate the research scope. Methodology to be used in this research is qualitative method. By using the qualitative method in research, limitation and improvements in QLASSIC can be found more deeply.

## 1.8 Research Methodology

This study carried out in five stages. Introduction, literature review, data collection, data analysis, conclusion, and recommendation are all included. At the early stage of research, a lot of discussions and changes in research topic have been gone through obtain exact picture of this research. Current issues and problems related to this research were gathered to include in the research problem. The problem is attached to make the problem statement look more relevant and more potent. This part was continued with the objective and significance of the research. In the literature review phase, each and every component of the topic deeply studied. Previous studies related to this topic investigated and comparison among each with other researches carried out. Reference for each component and previous investigations are essential in this phase. All the details have been used to explain further in research scope. The data collection phase was conducted after completing the literature review. For this research, qualitative method was used to collect data. Important information and current issues related to topics were deeply investigated in the literature review phase. All the details with reference will be inputted in the literature review part to be clearer, even to the person who does not know this topic. After completion of the literature review, initial preliminary survey was conducted to understand more the current implementation of QCLASSIC. After this process, a case study was carried out with semi-structured interview questions that developed based on the research objective. All the information from the literature review used to develop questions to be ask with respondents. After developing semi-structured questions, it has passed to the targeted respondents. Data collection analyst by NVivo 12 Plus software. The findings of the research compared with the literature review. At the end of the research, the framework was developed based on the whole result from the research. Figure 1.4 illustrates the flow of research.

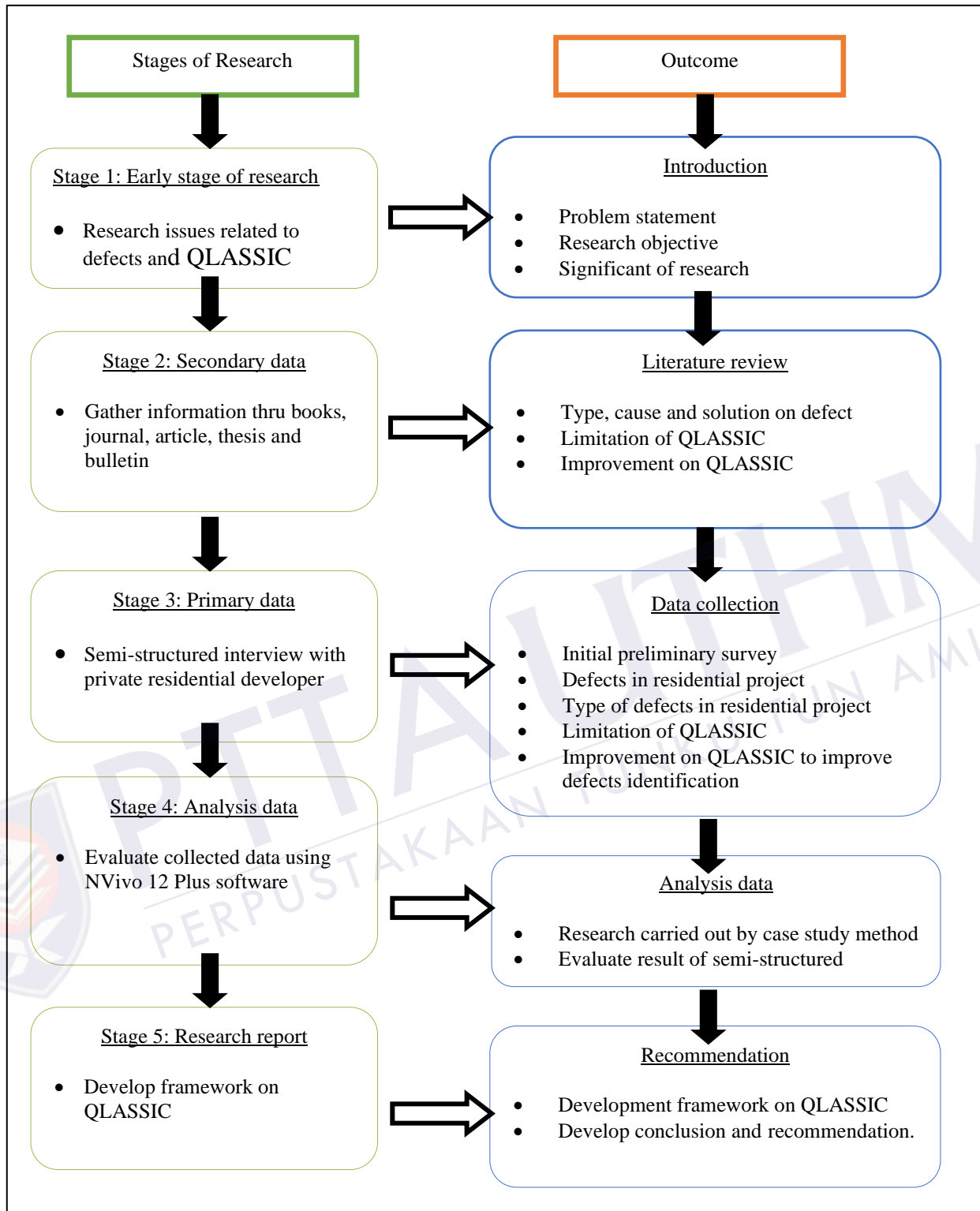


Figure 1.4 : Flow of research

## 1.9 Organization Of Thesis

Chapter one is to introduce the flow of carried out to achieve the objective. In this chapter, the research's problem statement, research question, and objective have been found out. Current issues on the defects and QLASSIC were gathered to make the information more relevant and more vital. In chapter two, the literature review was based on reading materials such as previous research, books, online search, and newspapers. Details will be gathered from all these sources to ensure a variety of knowledge and attribute are being considered. Literature review carries out to get a clear picture of the topic with support of facts and diagrams. The issues that will be discussed in this chapter are an introduction to QLASSIC and the limitation of QLASSIC in reducing defect. From the information gathered, a conceptual framework will be developed to improve QLASSIC towards reducing defects in residential construction projects.

Chapter three is a stage where data collection was taken place. The methodology which has been chosen for this research is qualitative. Semi-structured questions carried out to collect data from targeted people. The scope of this research is concerned with private residential developers. Proper information is needed from respondents to achieve the objectives that they choose in the early stage of research. In chapter four, data which collected from respondents analysed based on objective. All the details analysed in more into. The last part of this research is chapter five the conclusion and recommendation. In this part, all the questions which were stated during the interview has been discussed. Discussion of data compared with previous research to find out the variability. In conclusion, a framework has been developed to improve of QLASSIC to reduce residential project defects.

## 1.10 Summary

To conclude, Malaysia is a country with a rapidly expanding building industry. Malaysian construction projects include projects in the hospitality, industrial, office, education, community, residential, and civil sectors. Projects are established in collaboration with commercial and public sector developers. However, the Malaysian construction industry portal of 2018 claims that residential project development has resulted in a higher degree of profit for the country through the building sector. This knowledge was shared among developers several years earlier, and QLASSIC was created as a response to defects and performance issues. Several countries have developed quality assessment criteria for use in their construction

industries. As a result, CIDB developed a construction quality assessment framework to address quality concerns. However, it has been proven that QLASSIC has some limitations that may affect the performance level. Thus, this research identifies the limitations and improvements in QLASSIC to reduce defects. In this regard, this research scope will be on private residential developer, to resolve the limitation of QLASSIC towards defects identification.



## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

In Malaysia, construction industry is considered as an industry that is important for economic growth. providing individuals with substantial benefits and working rights. More software programmes have been implemented in order to complete client specifications to maintain consumer loyalty (Hew, 2018). In order to attract more customers worldwide, existing construction projects employ modern advancements, new plans, and creative skills. In the meantime, each construction project must emphasise consistency. Customers who are ready to spend billions of dollars want developers to produce a product with reasonable quality. Nonetheless, based on previous inquiries, it's possible that the customer's satisfaction rate on private projects is incredibly poor due to project defects (Baiburin, 2017). A defect can be described as a segment that affects the construction of a project. Also, after the implementation of QCLASSIC, defects problems are still cannot to be brought under control. This situation did not hit the standard of consumer satisfaction. As a result, this chapter have discussed the concept of defects, implementation of quality assessment in construction industry and development of QCLASSIC in Malaysia.

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