

Customer Satisfaction in Conquas and Qlassic Certified Housing Projects

Salimi bin Sulaiman¹, Ahmad Jusoh^{2*}, Kwok See Ying^{3*}, Somayah Soheilrad⁴

^{1,2,4} Azman Hashim International Business School, University Teknologi Malaysia (UTM), Skudai, Johor, Malaysia

³UTAR

* Corresponding author: ahmadj@utm.my

Abstract

Construction activities in Malaysia, as in many developing countries are growing tremendously which generate towards the nation Gross Domestic income. With the growing numbers of developments specifically build to cater for the growing demand for the residential, commercial houses, specific quality standards has to be developed in order to regulate the standard quality that the contractors will need to deliver. Construction Quality Assessment by Building Construction Authority (BCA Singapore) and Quality Assessment in Construction (QLASSIC) by CIDB Malaysia being developed to set certain benchmarking standard for the building quality. A lot of occurrences reported in the news where the purchasers of the houses were not satisfied with the quality level for the houses being delivered. The objective of this study is to relate the CONQUAS/QLASSIC to customer satisfaction of the residential housing. The methodology adopted questionnaire and individual purchaser response was unit of analysis. In summary, the different between QLASSIC- based assessment and CONQUAS- based assessment in regards to customer satisfaction, was significant which stated for the satisfaction for the CONQUAS is higher than the QLASSIC projects. Hopefully, this research added value to academic research in understanding the benefit of implementing CONQUAS/QLASSIC standards towards increasing the market value of the property market

Keywords: CONQUAS, QLASSIC, Quality Assessment, Customer Satisfaction

ARTICLE INFORMATION

Received: 5 January 2019
Revised: 18 February 2019
Accepted: 10 April 2019

DOI: 10.31580/jpvai.v2i1.478

© Readers Insight Publication

INTRODUCTION

Poor quality in construction projects is a common phenomenon in the world. Many disputes happened among clients, house owners and parties involved in construction involving the key stakeholders in construction industry namely client e.g. property developer, appointed consultants and contractors on construction defects cases. Construction defects seen will be even more critical if it involves latent defect which will persists years after the completed units has already been occupied by the purchasers. When the purchasers bought their dream properties, they surely will expect for liveable houses which will be minimal in defects.

However, there have been numerous incidences where house purchasers expressed their dissatisfaction over the quality of workmanship and when they inspected their houses upon being handover the key to their houses. To some extent, some purchasers feel being false promised by the developer as they think actual unit delivered did not meet their sign Sales and Purchase Agreement especially on the type of material used (e.g. marble tiling grades etc.). Referring to [21], one good example of housing defects can be found in KC Chan Brothers Development Sdn Bhd vs Tan Kon Seng, in year 2000, in which 26 buyers of low cost units complained that specifications of the building as shown on the approved plan has not been complied. Height of the double storey houses was only 18 feet high instead of 20 feet and asbestos ceiling missing with the septic tank short by 5 inches in dimension.

In order to address the sub-standards workmanship quality in construction, Malaysia government through one of its authorities

Construction Industry Development Board (CIDB), has introduced the QLASSIC somewhere in the late 90's which led to introduction of QLASSIC guideline. Eventually in the year 2006, this document was reviewed and subsequently upgraded to Construction Industry Standard (CIS) known as CIS 7:2006, Quality Assessment System for Building Construction Works. The primary objective of CIS 7:2006 was to provide a benchmark on the standards that can be applied by the industry to measure quality performance of their respective construction projects objectively [17].

The main assessment elements in this standard are adopted from Construction Quality Assessment (CONQUAS) practices by Building and Construction Authority (BCA) in Singapore. Generally, the higher the QLASSIC score will proportionately reflect the higher quality output of the assessed construction project [17]. Construction Quality Assessment (CONQUAS) was introduced in Singapore in 1989 and serves as a standard assessment system on the quality of building projects. CONQUAS has been periodically fine-tuned to keep pace with changes in technology and quality demand of a more sophisticated population. Some contractors in Malaysia were already practicing this standard in order to obtain client satisfaction [12,4].

Today, CONQUAS is widely recognized and accepted internationally as a benchmark tool for quality successfully adapted by countries like UK and Hong Kong [19,5]. CONQUAS is now a registered trademark in Singapore, China, Hong Kong, United Kingdom, Australia, South Africa and increasingly recognized in Malaysia [19]. In Malaysia, property development is a significant contribution to the construction industry where clients or buyers invest large sums of money in the hope that the investments will be

worthwhile and yield good economic returns. Clients start to realize the importance of quality and so will force developer to deliver better quality end products which can give them full satisfaction [19]. So it is the intention of this paper to examine the practice adopted by different developers in adopting CONQUAS or QLASSIC assessment in their projects and relate that to Customer Satisfaction of the house owners.

One of the programme subscribe by ABC company in delivering quality products to the purchaser was on CONQUAS (Construction Quality Assessment by developed by Building Construction Authority (BCA) of Singapore and Quality Assessment in Construction (QLASSIC) developed by Construction Industry Development Berhad (CIDB) Malaysia. This assessment will allow for target setting and ensure contractors to meet certain workmanship standards in the quality of finishing work for the developments. The ultimate aim of improving the quality standards in their development is in order to give assurance to their house buyers that they will be guaranteed of high quality products whenever they purchase their dream houses in ABC company projects.

ABC Company is a property development arm for a Government Linked Company which was established with the aim to become a competitive conglomerate at the international level. To reach to that stature, program on raising the construction workmanship quality has been introduced in ABC Company to beef up the quality expectation on the houses delivered to purchasers. One way, in which the how this is monitored is through the monitoring on the CONQUAS achievements inside the Key Performance Indicator (KPI's) for the Development projects. Since its inception in 2012, the key target for the CONQUAS KPI's has been raised year over year to reflect on raising the bar of quality achievements for all the projects within ABC Company. This is reflected happening as the actual average year over years score is improving.

However, despite the achieved result on external assessment or quality commitment statement in the organization vision, the rate of customer complaints due to poor workmanship issue due to building defects are still at the alarming rate. Despite the improvement in the CONQUAS / QLASSIC score, which means that the number if defects will be reducing, whether that will translate into the satisfied house owner is still questionable. In contrast, CONQUAS is more widely recognized and accepted by developers as well as contractors in the country [10]. Hence, this study is meant to provide another dimensions in term of property owners satisfaction when comes to 2 different types of assessment.

Even though the company has invested millions of dollars to ensure compliance to CONQUAS / QLASSIC standards over the years through training, seminar or benchmarking exercise, which does not necessarily translate to the end users to be satisfied when the products were handover to the purchasers. The above argument, bring us to the following research questions:

Is there any difference in the customer satisfaction level for CONQUAS and QLASSIC certified housing projects?

The research objectives are described as follows:

To determine if there is any difference in the Customer Satisfaction level for housing projects after completed CONQUAS assessment comparing it against the project after completed QLASSIC assessment.

Even though CONQUAS is said to be a popular method [19], however no studies has so far being conducted compare the customer satisfaction level from both assessment. From the academic standpoint, this study is to establish whether there is any significant impact whenever developer applied for the CONQUAS / QLASSIC assessment to the customer satisfaction level. As of now, very limited research in the market did study about CONQUAS and QLASSIC impact to customer satisfaction and interrelationship, so this will open up the avenue for future research being develop in the similar nature.

LITERATURE REVIEW

Quality in Housing

The rapid pace of construction industry has set a new paradigm of product quality expected by the consumers. Quality, cost and time have long been recognized as the major target of concern by the client in constructions. With the revolution in customer expectation, purchasers are now well educated, even the low end marketed range of products does not mean that they accept and satisfied with low quality houses upon received of the keys to their dream houses. Quality to construction product refers to the goodness and the level of the satisfaction to the consumers [9]. [7] and [14] had discussed quality in construction in two groups namely design and construction. The aspects of quality are shown divided into the design and construction work method which are essential element for construction. The aspects of quality are shown in Figure 1, which considered essential for construction quality.

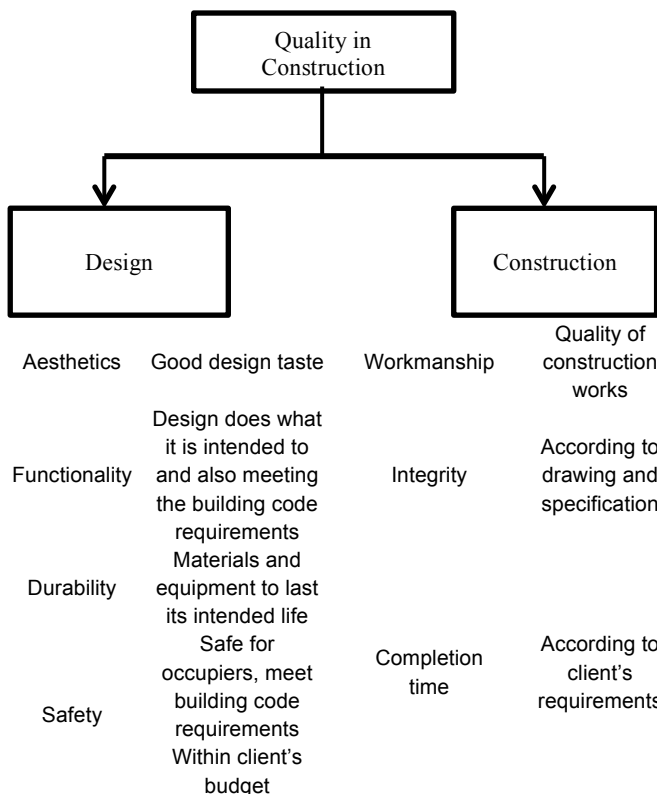


Fig. 1 Construction Quality Dimension

Under the construction work method element, 1 of the 3 main elements for the quality will be on the workmanship elements which describe the quality of constructed work.

This is where CONQUAS/QLASSIC assessment will be the standards used to measure the workmanship quality of the constructed work. As to be further discussed in the below topic, both CONQUAS and QLASSIC standards address the workmanship standard for the construction quality especially in the final architecture finishing.

What is CONQUAS Standard?

As Low et al. (1993) explain, CONQUAS system was essentially developed to meet three objectives:

- a) To have common quality evaluation system for construction projects.
- b) To provide an objective and measurable system for quantifying the quality standards of the building construction.
- c) To facilitate the systematic assessment of the quality standards within specific time and cost limits and raise the quality level in construction.

The assessment in the CONQUAS system divided into 3 parts:-



1. Structural work – covering formwork, reinforcement, concrete quality and finished concrete. Because most of the structural works for a building would be inaccessible after completion. Assessment is carried out during the entire construction process.
2. Architectural work – covering floors, walls, ceilings, doors, windows, components, M&E and roofs. The assessment is carried out at the completion of the project.
3. External work – covering pedestrians, walkways, drains, playgrounds, swimming pools, etc. The assessment is carried out at the project completion.

In addition, weightage of scoring assessment are varies according to building category as shown in Table1.

Weightage by building Category are given by the following Table1.

Table 1 Weightage of CONQUAS by building category

Component	A Commercial with central cooling system	B Commercial without central cooling system	C Private apt) (Highrise)	D Public housing	E Landed housing
Structural work	25%	30%	25%	35%	30%
Architectural work	55%	60%	65%	60%	65%
M&E work	20%	10%	10%	5%	5%
Total	100%	100%	100%	100%	100%

Points to be noted, for the overseas project, structural assessment will not be conducted, hence the assessment will be purely based on the architectural work and the M&E work. Weighted architectural element for CONQUAS scoring given by table 2.

Table 2 Weightage architectural CONQUAS element

Architectural Element	Total	Breakdown
Internal Finishes	56%	
Floor		16%
Internal Wall		16%
Ceiling		6%
Door		6%
Window Component		6%
Roof	4%	
External Wall	12%	
External Work	6%	

For the purpose of this study, all the above elements will be evaluated for the customer satisfaction survey except for the roof and external work elements. Roof elements for example applicable for the flat roof type of houses, while the sample used for this study, all using the pitch roof type of housing. Meanwhile, the external work element is not evaluated as different project will have different type of external works offered. So in order not to create any bias in term of evaluation result, this roof and external work will not be included inside the instruments questionnaires.

What is QCLASSIC standard?

Stands for Quality Assessment in Construction (QCLASSIC) was developed in November 2006 by the CIDB’s spearhead Technical Committee (TC) consisting of representative from Public Works Department (PWD), Jabatan Perumahan Negara (JPN), Real Estate and Housing Developers Association (REHDA), Pertubuhan Arkitek Malaysia (PAM), Master Builders Association Malaysia (MBAM), National House Buyers association and others relevant organizations

and authorities. Standards named as CIS 7:2006, (Construction Industry Standard).

QCLASSIC is a system that evaluates and assesses the quality of workmanship through a sampling and statistical approach. [17] stated that the objectives of QCLASSIC (CIDB, 2006) are to achieve the following objectives:

- a) To have a standard quality assessment system as a benchmark for quality of workmanship of the building projects.
- b) To assess quality of workmanship of the building projects based on approved standards contractors to achieve defect-free when carrying out construction work.
- c) To evaluate the performance of contractors based on quality of workmanship.
- d) To compile data for statistical analysis.

2.4 Assessment Approach and Sampling Process

As it is impractical to assess all elements in a construction project, QCLASSIC assessment uses a sampling process to carry out the assessment. The sampling takes into account the size of the building as well as the distribution of the various functional locations. This will enable the assessment to adequately represent the entire building before carrying out the assessment; the assessor will determine the samples (elements or locations) that need to be assessed.

The samples must be distributed as uniformly as possible throughout the project and various construction stages. The samples are selected from drawings and plans of the relevant construction project. Sampling of the structural works is divided into two or three stages beginning of the commencement of the superstructure activity until the completion of the structural works depending on the scope of the structural activities. All locations in the construction project must be made available for the assessment.

There are several elements that the assessor can determine on the standard of quality that are implemented by their client or contractor. Hence, the assessment will depend on the package of assessment required. The package elements as shown in Table 3 are as follows:

STRUCTURAL WORKS

The assessment is carried out throughout various construction stages. The numbers of samples are determined based on the gross floor area (GFA) of the building with a minimum and maximum number of samples.

ARCHITECTURAL WORKS

The assessment is carried out upon completion of the building project and before handing over of the project. The samples are determined based on the gross floor area (GFA) of the building with a minimum and maximum number of samples.

MECHANICAL AND ELECTRICAL (M & E) WORKS

The samples are determined based on the gross floor area (GFA) of the building with a minimum and maximum number of samples. For completed projects the assessment is carried out upon completion of the building project and before handing over of the project. For ongoing projects the assessment is carried out throughout the various construction stages.

EXTERNAL WORKS

The assessment is carried out upon completion of the building and before handing over of the project. The numbers of samples are determined based on (10m length section/ location) with a minimum number of samples.

Table 3 Weightage of QCLASSIC by Building Category

Component	A Landed Housing	B Stratified Housing	C Public Building	D Special Public Building
Structural Work	25%	30%	30%	30%
Architectural Work	60%	50%	45%	35%
M&E Work	5%	10%	15%	25%
External Work	10%	10%	10%	10%
Total	100%	100%	100%	100%



For QLASSIC assessment the scoring weightage also varies according to building category as shown in Table 3.

Category A (Landed housing)

- Detached, Semi Detached, Terrace, Cluster

Category B (Stratified housing)

- Flat, Apartment, Condominiums, Town House

Category C (Public building)

- Office Building, Schools and other facilities intended for public use

Category D (Special Public building)

- Hospital and Airports only

For the architectural element for QLASSIC the weightage scoring given by table 4:

Table 4 Weightage Architectural QLASSIC Element

Architectural Element	Total	Breakdown
Internal Finishes	56%	
Floor		16%
Internal Wall		16%
Ceiling		6%
Door		6%
Window		6%
Component/Fixtures		6%

For the purpose of this study, same reasoning as for CONQUAS, all the above elements will be evaluated for the customer satisfaction survey except for the roof and external work elements. In order not to create any bias in term of evaluation result, this roof and external work will not be included inside the instruments questionnaires.

During the day of assessment for QLASSIC, samples selected must be distributed as uniformly as possible throughout the project with reference to drawings and plans of the relevant construction project. Sampling of the structural works is divided into two or three stages beginning of the commencement of the superstructure activity until the completion of the structural works depending on the scope of the structural activities. All locations in the construction project must be made available for the assessment by the assigned assessors.

Review of the Past Research on the Customer Satisfaction

A review of the past researches was conducted in order to assess the past studies that have been conducted on the customer satisfaction against the construction quality standards. From the review of the past researches we can summarize the following conclusion:

- a) Customer satisfaction correlated with the defects quality of houses
- b) This is supported by [16], in their articles which generally mention strong correlation exists between housing defects to customer satisfaction. Fewer defects will result to a more satisfied customer.
- c) Evaluation of housing defects in Malaysia construction industry reveals that the architecture finish will be the most common defect will be on the wall with plaster crack seen as the biggest problem complaint by the purchasers [6]. Six common defects occur will be crack, moisture, peeling off, painting defect, rust ant rot (Ismail et al., 2012).
- d) Study on the defect with Build to Sell concepts reveals that less defects will be produced compared to the conventional Sell than Build concept [15, 16, 24].
- e) Use of the QLASSIC as a standard method for building Quality assessment used by [6] and CONQUAS method as a standard measurement used by [3] reveals standard quality measurement on the quality standards.
- f) Customer satisfaction towards the quality of the houses vary according to the type of the houses build as low cost house owners tend to be very satisfied with the house quality and more concern on the facilities more compared to the normal terrace houses, [7,8] .

- g) Post Occupancy Evaluation provides valuable approach towards analysing performance of government or public building in Malaysia [18].

Construction Workmanship Quality that Contribute towards Customer Satisfaction in Quality Housing

From the review of the [6] [11] and [16], the following factors could be drawn up on the construction quality and customer satisfaction. Those factors are:-

- a) Improving construction quality will have direct impact on the customer satisfaction as the strong correlation exists between the quality and customer satisfaction. Fewer defects will translate into more satisfied customer.
- b) In order to improve on the construction quality, past reviews have pointed toward few elements which were common in the Malaysia construction industries. For example, [6] states on architecture finish and [11], points towards cracking defect, crack, moisture, peeling off, painting defect, rust ant rot. Architecture finishes are parts of the CONQUAS / QLASSIC assessment and with the improved result seen on the result, will translate to improved customer satisfaction on the quality.

Also, from the previous research there has been a study on the purchaser’s satisfaction with respect to elements specified in QLASSIC and CONQUAS, and the rating achieved only at the average satisfaction level. However, there has been no correlation study to relate this with the QLASSIC element achievement and how did CONQUAS and QLASSIC fare when measured on the customer satisfaction perspective. It was noted also that the CONQUAS is a more popular instruments engaged by the property developer in Malaysia, however no study has tried to link the investment put in against the return to meet the total customer satisfaction. So this is what this research question is trying to answer in this paper.

After all the above discussion on the customer satisfaction the hypothesis question which this research paper willing to address will be as the following :

H1 – There is significant difference in Customer Satisfaction between CONQUAS and QLASSIC certified housing projects.

METHODOLOGY

The Unit of Analysis

Unit of analysis will be individual purchaser response. Researcher measure the level of customer satisfaction based on different element in the CONQUAS or QLASSIC standards. Based on the standard elements, the questionnaires will be developed to measure on the purchasers’ satisfaction level of each element and its effect towards the final customer satisfaction level.

3.2 Population of Study

This research was carried out within the ABC Company. The population of ABC Company is 196 companies in Malaysia. This study focuses on the result of the customer satisfaction survey after the assessment of the CONQUAS/QLASSIC assessment for development. For CONQUAS assessment 2 developments were used for this research namely project East Ledang 4B1 and East Ledang 4B2. For study on the post QLASSIC assessments, 2 developments were used, namely IOI Phase 3A and IOI Phase 6B03. So after third party assessment, this satisfaction survey will determine whether homeowners were satisfied with the quality of housing upon received key during handover.

Research Sampling

Research sampling is based on stratified random sampling technique where samples will be chosen from 4 sets of developments



representing CONQUAS assessed development and QLASSIC assessed development respectively. Sampling will be picked from the whole list of purchasers under the defined developments. The reasons to adapt the random sampling as the research only focus on intended an development which has gone through the CONQUAS or QLASSIC assessment and the type of development is uniform for the sample being selected.

Research instruments for data collection

The research instruments consist of four (4) sections, section A, B, C and D. The researches instruments consist of questions covering the demographics, respondent background, section B, respondent satisfaction of the workmanship quality of the houses they purchase and section C, on their additional comment for feedback.

SECTION A

The first part covered the background of the respondent which consisted of the certain background details of the respondents. This part was designed to gather basic background details of the respondents and their property purchased such as respondent status, age range, tenancy / own house type and respondent occupations. This provided information will be vital in determining respondents' experience with their houses and thus correctly assessing the satisfaction level of the purchasers to the houses they are purchasing.

SECTION B

This form the most important part in the questionnaires where respondents were asked to indicate their satisfaction level on the quality of CONQUAS/QLASSIC elements. In order to measure the variable, ratio scaling using Likert scale is chosen for the study. The Likert scale will consist of the range one (1) to five (5) refer to Table 5 below.

Table 5 Likert scale rating

Level	Scale
Strongly Disagree	1
Disagree	2
Neutral	3
Agree	4
Strongly Agree	5

Example of defects types used for both CONQUAS and QLASSIC assessment were grouped into the same defect category according to elements given in the following Table 6. As explained earlier, roof and external work elements were omitted from evaluation as assessment done for flat roof type of houses, while the sample used for this study, all using the pitch roof type of housing. Meanwhile, the external work element is not evaluated as different project will have different type of external works offered. In order not to create any bias in term of evaluation result, this roof and external work will not be included inside the instruments questionnaires.

Table 6 Defects Grouping Guide for Internal Finishes CONQUAS & QLASSIC

Elements	Defects Grouping	Defects Description
Floor Wall/ External wall	Finishing	Stains, Painting/ Coating Defects, Tonality, Patchy & Roughness
	Alignment & Evenness	Alignment, Unevenness, Squareness
	Crack & Damages	Crack, Chipping, Dent, Scratches
	Hollowness / Roughness	For internal wall (Hollowness) For external wall (Roughness)
	Jointing	Joints, Pointing
Ceiling	Finishing	Stains, Painting/ Coating Defects, Patchy & Roughness
	Alignment &	Appearance of the ceiling levelling

Evenness	
Crack & Damages	Crack, Chipping, Dent, Scratches
Roughness	Rough surface
Jointing	Joints, Pointing
Joints & Gap	Joints, Gap etc. too big, Inconsistent, Improper Seal
Alignment & Evenness	Appearance of the door/window/component /M&E level
Material & Damages	Crack, Chipping, Dent, Scratches, Sag, Warp
Functionality	Movement, Functionality, cannot be opened or closed properly, Loose
Accessories	Missing items, Improper Fixing,
Defects	Stains, Corrosion, Other damages

Sample Size

A questionnaire survey was conducted to collect the required data directly from the home owners where stratified samples were then randomly selected from newly handover keys developments under namely East Ledang Phase 4B1, East Ledang 4B2, IOI Phase 3A and IOI Phase 6B03. The criteria for selection of this project is based on the project which were within 6 months of handover period from the date of the research was being conducted. Hence, during this period, there will be a lot of interaction between household owners with the customer service department in settling defect complaints exist within the 24 months defect liability period (DLP). During house hold owners came to the customer service department for settling their concerns, the questionnaires were distributed to the owners to be filled up and return to the customer service after filled up. A total of 150 householders were randomly distributed with the questionnaires through the project handover / customer service department during the sampling period of the questionnaires. The number of questionnaires sample distributed will meet the minimum requirement of sample size required as defined by the [22].

For this research, determination of sample size is referring to [13]. According to the [13] table in the population for 196, total minimum sample size of respondents is equal 132. Table 7 illustrate a part of Morgan's table for determining sample size from a given population

Table 7 Kerjcie and Morgan (1970)

Population Size	Sample Size
180	123
190	127
200	132
210	136

Taking into consideration the response rate issue in social survey. The number of questionnaire sent to targeted respondents was 150 copies. Due to poor response rate, the distribution of questionnaire was done three times and finally only 84 questionnaires were returned. The response rate of 56% can be attributed to enthusiastic support from the respondents. However, only 77 were used for the analysis due to incomplete information in some of the survey forms. Summary of survey tabulation is shown in Table 8.

Table 8 Summary of survey tabulated

Item	CONQUAS		QLASSIC	
	EL 4B1	EL 4B2	IOI 3A	IOI 6B03
Total Population	35	83	52	26
Distributed Survey	20	30	30	20
Return Survey	15	25	28	16
Used Survey	10	27	25	15

RESULTS AND DISCUSSION

The source of data collection for this research was through self-administered of survey questionnaires in the study area. Data



collection method will be based on the survey distributed to the specified homeowner as determine in the case studies. This survey will determine the customer satisfaction level of the homeowners based on the quality of houses with respect to the CONQUAS/QLASSIC element. This element will be in the form of Floors/Wall/Ceiling/Door/Window/Component, M&E and External Wall. Instruments used for questionnaires is valid since it adopts the establish elements according to CONQUAS and QLASSIC assessments. These standards will follow the CONQUAS standard, revision 8 as released by Building Construction Authority (BCA) Singapore and CIS 7: 2006 for QLASSIC as released by Construction Industry Development Board (CIDB) Malaysia. Reliability of the questionnaires will be tested using the Cronbach-Alpha tools which will determine the stability of the questionnaires being developed will address to the data being collected. In this research, reliability test was used in order to find the stability of the data collection. Cronbach's coefficient (α) provides an indication of the average correlation among all the items that make up the scale. Values range from 0 to 1 with higher values indicating greater reliability. Cronbach's α of value 0.65 to 0.95 is satisfactory. The following Table 9 summarizes the Cronbach's α value relative to the items in the questionnaires for Customer Satisfaction questionnaires.

Table 9 Customer Satisfaction's Cronbach's α

Cronbach's α	N of Items
Floor	0.857
Wall	0.845
Ceiling	0.859
Door	0.808
Window	0.851
Component	0.827
M&E	0.867
External wall	0.859
Total	0.847

The result of $\alpha = 0.847$ which indicate scale used for the present study is considered as highly reliable to measure customer satisfaction.

A total of 77 questionnaires were usable as the rest was incomplete. It was found that the majority of the respondents are middle-aged (between 31 – 50 years). Detail of the demographics for the respondent can be referred to table 10.

Table 10 Demographic breakdown of the respondents

Characteristics	Group	Percentage
Age	20 and below	1.3
	21-30	9.1
	31-40	19.5
	41-50	57.1
	51 and above	13.0
Marital status	Single	13.0
	Married without Children	15.6
	Married with children	64.9
	Divorced / Separated	6.5
Formal Education	Primary	1.3
	Secondary	10.4
	College	32.5
	University	55.9
	Managerial/Professional	39.0
Occupation	Technical	19.5
	Sales/Marketing	13.0
	Teaching	11.7
	Business	9.1
	Others	7.7
	RM 24,000 and below	2.6
Income	RM 24,001 – RM 72,000	10.4
	RM 72,001 – RM 96,000	61.0
	RM 96,001 and above	26.0

After establishing the goodness of data, the descriptive statistics including: measure of central tendency and dispersion (including Mean and standard deviation) have been obtained for the items of this

study. Descriptive statistics of constructs in the model can provide insights regarding the perception and subjective response of participants for each given construct. The result of descriptive analysis is shown in table 11.

Table 11 Descriptive statistical analysis

Group	Variable Name	N	Mean	Std. Deviation
QLASSIC	Floor	40	3.5750	.45334
	Wall	40	3.7400	.60798
	Ceiling	40	3.8600	.60629
	Door	40	3.8300	.64139
	Window	40	3.7650	.67007
CONQUAS	Component	40	3.8050	.58439
	Floor	37	3.9568	.61848
	Wall	37	4.0270	.59845
	Ceiling	37	4.1027	.65933
	Door	37	4.1081	.66265
	Window	37	4.1189	.65906
	Component	37	4.1730	.65517
Total	Floor	77	3.7584	.56878
	Wall	77	3.8779	.61657
	Ceiling	77	3.9766	.63988
	Door	77	3.9636	.66231
	Window	77	3.9351	.68398
	Component	77	3.9818	.64251

The t-test analysis was conducted to determine whether there is a difference in customer satisfaction level for housing projects after completed CONQUAS assessment against the project after completed the QLASSIC assessment.

Table 12 Customer Satisfaction Comparison on CONQUAS vs QLASSIC

Customer Satisfaction	Standards			
	CONQUAS	QLASSIC	t	df
	4.08 (.5377)	3.77 (.5597)	2.337*	75

Note : * $p < .05$. Standard deviation appear in parentheses below means

The statistical result, as shown in Table 12 indicated that the customer satisfaction level for project using CONQUAS assessment is higher compared to QLASSIC assessment. In summary, the different between QLASSIC- based assessment and CONQUAS-based assessment in regards to customer satisfaction, was significant ($t = 2.34$, $df = 75$, $p = 0.022$) which stated for the satisfaction for the CONQUAS is higher than the QLASSIC projects.

Table 13 Mean analysis for Detail Element

	Elements		
	Floor	Wall	Window
CONQUAS	3.9568 (.61848)	4.0270 (.59845)	4.1189 (.65906)
QLASSIC	3.5750 (0.4533)	3.7400 (.60798)	3.7650 (.67007)

To understand further on the contribution of the important elements within CONQUAS or QLASSIC, further tabulation of the mean analysis was conducted from the survey obtained. The intention of this analysis is to specify which element usually customer will be less satisfied whenever they receive their keys. This analysis is shown in the above table. From this analysis, floor and wall elements are seen as the key elements which contribute the most to the lower satisfied score as both of them scored the lowest among all other elements. For example, for QLASSIC, floor scored at 3.57 and wall at 3.74 respectively.



For CONQUAS, floor scored 3.96 (only element below 4) and wall at marginally 4.02 (slightly above 4). The significant of this result is consistent with the finding reported by [23] which stated that floor and wall are the most defective, accounting for 63.69% of the defects. Defect group is related to finishing, alignment, evenness and joint and gap. These types of defects have been asserted by [23] that is strongly associated with poor workmanship quality. Therefore, workmanship quality should be enhanced to reduce building defects and improve the quality of provided house.

CONCLUSION

CONQUAS or QCLASSIC both are systematic tools to measure the level of defects in completed housing before they are being handover to the purchasers.

Through their assessments, important elements, such as wall, floor, ceiling, door, window, component, M&E, external wall and external works are inspected to ensure less defects exists, or have been rectified by the contractors before handover of keys to purchasers. Whenever less defects seen in the house being handover this will result to higher satisfaction for the purchaser. This will be support to [16] which states that satisfaction lies within the occupants when the house defects are less and dissatisfaction when the houses are fully laden with defects. These findings advocate previous findings established by [1,2] and [20] that the occupants' satisfaction level has a relationship with their house conditions.

So this research question is to compare is there any difference in the satisfaction level for CONQUAS / QCLASSIC assessed projects. In order to answer the Research Objective 1; the t-test analysis was used to identify the significant level between the customer satisfaction data from the QCLASSIC assessed project and CONQUAS assessed project.

Based on the result, this study emphasizes that there is significant difference in the customer satisfaction level ($p = .022 < 0.05$) which indicate for significant difference in the customer satisfaction level.

This positive effect of customer satisfaction level for projects which adopted the CONQUAS assessment in comparison to the QCLASSIC assessment is reflective of the theory put forward by [19] which quoted as saying "CIDB Malaysia provides QCLASSIC assessment at no cost. However, due to **lack of awareness** and **confidence** in QCLASSIC, only few developers have engaged CIDB to assess the quality of their projects using QCLASSIC". In contrast, CONQUAS is more widely recognized and accepted by developers and contractors in the country [19].

This explains why the CONQUAS will be much more preferred assessments among developers compared to QCLASSIC. Lack of awareness and confidence in the QCLASSIC standards maturity may be one of the factors which explain the difference in the customer satisfaction level itself. Furthermore as stated by [12], CIDB Malaysia introduced QCLASSIC – Construction Industry Standard (CIS) – CIS 7:2006 which is adapted from CONQUAS Singapore to be suit into Malaysia's construction industry. Thus, CONQUAS is seen more mature standard compared to QCLASSIC. [3] stated that there are 2 types of quality measurement system namely the QCLASSIC and CONQUAS which possess similar evaluation system, however CONQUAS is more popular in usage.

Detail analysis shows that floor and wall elements are seen as the key elements which contribute the most to the lower satisfied score as both of them scored the lowest among all other elements. The significant of this result is consistent with the finding reported by [23], which stated that floor and wall are the most defective, accounting for 63.69% of the defects. Defect group is related to finishing, alignment, evenness and joint and gap. These types of defects have been asserted by [23] that is strongly associated with poor workmanship quality. Therefore, workmanship quality should be enhanced to reduce building defects and improve the quality of provided house. In conclusion, with reduction in defects in the wall and floor will directly improve on the customer satisfaction of the occupant owners.

As [19] quoted, CONQUAS is more recognized and accepted by developers as well as home buyers. She further quoted by Chow Chee Wah, Managing Director of Gamuda Land Bhd [10], "As a pioneer for the implementation of CONQUAS for landed properties, we are not only setting the trend for ourselves but also for the industry. We are always thinking about the benefits for our purchasers with the aim to constantly provide a higher standard workmanship as well as better quality buildings.

Developers have started using CONQUAS as a measure of quality to promote and market their projects. It is common for developers to specify target CONQUAS scores in their construction contracts for their contractors to achieve. CONQUAS can be considered to be an effective tool that the local construction industry can adopt in order to achieve higher quality standard in building projects.

The objective of the research has been achieved based on the literature review from articles, journals and books; finding from questionnaire survey; and analysis results. This research has answered the question on CONQUAS assessment will be evaluated as better and more popular among the developers to be implemented in their projects. This is in support of the [19] theories of CONQUAS will be more widely practiced among the property players in Malaysia. This is mainly due to maturity for the CONQUAS standards already in the market longer enough compared to QCLASSIC assessment standard introduced by CIDB. CONQUAS already long established provides consistencies in the evaluation method thus gives confidence in the developer to engage their assessments will fairly produce consistent results according to the actual feel of the quality level.

References:

- [1] Adrienne, CCM. 2007. Measuring residential satisfaction: a residential environmental satisfaction scale (RESS). *Journal of Housing and the Built Environment*. 1 (22): 287-304.
- [2] Auchterlounie, T. 2009. Recurring quality issues in the UK private house building industry. *Structural Survey*. 27 (3): 241-251.
- [3] Bachan Singh B.J.S, Abdul Rahim A.H., Mohd Sukry .M . 2012. Standard Quality Achievement Level for Mont Kiara 11", *APSEC-ICCER 2012, 2-4 October 2012 Surabaya*.
- [4] Building Construction Authority (BCA). 2000. BCA Construction Quality Assessment System. CONQUAS overview. www.bca.gov.sg/.../conquas_abt.html. Retrieved on 25 April 2015
- [5] Building Construction Authority (BCA). 2011. BCA Construction Quality Assessment System. CONQUAS overview. www.bca.gov.sg/.../conquas_abt.html. Retrieved on 25 April 2015
- [6] Che Ani, A.I., Mohd Tawil, N.T., Johar, S., Abd Razak, M.Z., Yahya, H. 2014. Building Condition Assessment for New Houses : A case study in Terrace Houses. *Jurnal Teknologi UTM*. 70(1) : 43-50.
- [7] Faizah Abu Bakar. 2008. Customer Satisfaction Toward Quality of Workmanship in Low Cost Housing in Klang Valley. *Master Thesis*. University Teknologi Malaysia.
- [8] Hairuddin Mohammad (2009), "Quality and Satisfaction of House Owners for Industrialized Building System and Conventional Building System". *Master Thesis*. University Teknologi Malaysia
- [9] House Buyer Association (HBA). 2008. Make a building inspection a norm (Part 1). Retrieved from [www.iproperty.com.my/news/697/make-building-inspection-a-norm \(Part 2\)](http://www.iproperty.com.my/news/697/make-building-inspection-a-norm-Part-2), Retrieved on 25 May 2015)
- [10] House Buyer Association (HBA). 2009. Make a building inspection a norm (Part 3). Retrieved from [www.iproperty.com.my/news/697/make-building-inspection-a-norm \(Part 1\)](http://www.iproperty.com.my/news/697/make-building-inspection-a-norm-Part-1), Retrieved on 25 May 2015).
- [11] I.Ismail, A.I Che Ani, N.M Tawil, H Yahaya and M.Z. Abd Razak. 2012. Housing Defect of Newly Completed House: An Analysis Using Condition Survey Protocol (CSP) 1 Matrix. *International Journal of Civil and Structural, Construction and Architectural Engineering*. 6 (6): 30-33.
- [12] Kam J.K., Ahmad, H, Abdul, H. 2012. The relationship between motives and benefits on adopting QCLASSIC –CIS 7:2006 in Malaysia Construction Industry. *International Journal for Quality Research*. 6 (4): 321-332.
- [13] Robert V. Krejcie, Daryle W. Morgan. 1970. Determining Sample Size for Research Activities. *Educational and Psychological Measurement*. 30(3). 607 - 610
- [14] McCabe, Steven. 1998. Quality Improvement Techniques in Construction, England. *Longman*.

- [15] Mohd Fauzi S.N.F, Yusof N., Zainal Abidin N. 2011. Evaluation of housing defects in Build-Then Sell houses: A study of Six Residential Areas. *International Journal of Social, Education, Economics and Management Engineering*. 5 (10): 198-204.
- [16] Mohd Fauzi S.N.F., Nor Aini Y., Nazirah, Z.A. 2012. The relationship of housing defects, occupants' satisfaction and loyalty behavior in build-then-sell houses. *Social and Behavioral Sciences*. 2 (62): 75-86.
- [17] Mukhtar, C.A. 2013. Exploring The Potential of Integration Quality Assessment System in Construction (QLASSIC) with ISO 9001 Quality Management System (QMS). *International Journal for Quality Research*. 8 (1): 73-86.
- [18] Nawawi, A.H., Khalil, N. 2008. Post Occupancy evaluation correlated with building occupants' satisfaction : An approach to performance evaluation of government and public buildings. *Journal of Building Appraisal*. 4 (2): 59-69.
- [19] Norizan, A., Muhammad Nazreen, S., Ahmad Anuar, O. 2014. Assessing the implementation of CONQUAS standard amongst Contractors towards Improving Quality of workmanship. *Jurutera*, April 2014, 25-28.
- [20] Ozaki, R. 2010. Customer-focused approaches to innovation in house building. *Construction Management and Economics*. 21(6): 557 -564.
- [21] Sufian, A., Rahman, R. 2008. Quality Housing: Regulatory and Administrative Framework in Malaysia. *International Journal of Economics and Management*. 2(1): 141-156.
- [22] Tabachnick, B., & Fidell, L. (2007). *Using multivariate statistics* (Fifth Edition). Pearson.
- [23] Wai Kiong, C., and Sui Pheng, L. (2005). Assessment of defects at construction and occupancy stages, *Journal of Performance of Constructed Facilities*, 19(4), 283-289.
- [24] Zaki, N. E. B. (2018). Impact of Service Quality of Land Transportation on Customer Satisfaction at Johor Port Logistics. *Journal of Public Value and Administration Insights*, 1(1), 7-13.