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Statistical Analysis on Customer Satisfaction of Bungalow Houses in Malacca Residential Areas

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Abstract – *This paper presents a case study of customer satisfaction of bungalow houses after the handover process. Statistical method called t-test is used to compare the respondents' data. Mean analysis is used to represent the data and finally Pearson Correlation technique is applied to show that the respondents have their own interest to recommend this house building to their friends or vice versa. At the end of this study, the analysis shows that there are two types of respondents; the first agree on the quality and second, disagree after the handover process by the house developer.*
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Keywords: t-test, Pearson correlation, customer satisfaction, bungalow.

1.0 INTRODUCTION

Having a homeownership is a dream to everyone in Malaysia. However, some of the Malaysian people only rent a house due to some factors, particularly financial and work place constraints. The Malaysian government has introduced several housing programs, such as the People's Housing Programme (PPR) since 1998 and 1Malaysia People's Housing Programme (PR1MA) since 2012 to ensure all families; especially those who earn lower income salaries to own a house [1]. These affordable house programmes are available to the applicants who meet the criteria and still running in strategic locations nationwide. Apart from the government housing programmes, private developers also play a role in enhancing the growth of the housing industry [2]. Most of the private developers prefer to develop a housing area with multiple types of housing unit, i.e. from terrace to bungalow or semi-D, in order to attract potential buyers from the lower to higher income salary groups [3].

As a developing country, the housing industry in Malaysia has shown progressive growth over the years. Malacca, declared as a World Heritage Site in Malaysia also shows similar trends, where there are numerous housing projects running progressively. In line with the increasing numbers of housing projects, the Malaysian government has emphasized that houses should provide residents safety, security, comfort, health, privacy and other services [4]. In addition, the government also has produced numbers of housing policies and created a related institution/board to ensure the interest of buyers and developers' side are guaranteed.

From previous research work, there is an evident of buyer dissatisfactions, typically in Malaysia [5 and 6]. The issue of dissatisfaction among the home buyers is commonly resulted from housing abandonment, product quality and service quality [7-9]. Thus, the measurement of buyer satisfaction is the main interest of this paper. It covers determinants in relation to the buyer's satisfaction which includes house quality, building safety and developer responsibilities. In this study, the targeted respondents are specifically the buyers of bungalow houses in Melaka. The survey form and then statistical analysis are used in this study to find out the problems and needs of the home buyers in this housing area. The study contributes some information on the new location where the survey was done.

2.0 METHODOLOGY

The major objective of this study is to measure the level of customer satisfaction after the handover process of new houses. In this study, t-test approach is used to compare whether there are differences between two means or if the mean of the sample is different from the mean of the population [10]. Standard deviation is a key factor of this study. The standard deviation is also known as a root-mean square deviation. It can be defined as a

$$\sigma = \left[\frac{1}{n} \sum_{i=1}^{n} (x_i - x_m)^2 \right]^{1/2} \tag{1}$$

where n is the reading number, x_i is mean and x_m is arithmetic mean, respectively.

The arithmetic mean equation can be expressed by

$$x_m = \frac{1}{n} \sum_{i=1}^{n} x_i \tag{2}$$

to avoid the bias in the analysis of small sets of data, the sample standard deviation is used and it can be derived as

$$\sigma = \left[\frac{\sum_{i=1}^{n} (x_i - x_m)^2}{n-1} \right]^{1/2} \tag{3}$$

According to the approach that has been used, the highest standard deviation proportional with the highest respond from the respondents is recorded. Besides, there are several steps involved in making this study successful and it is shown in Figure 1.

3.0 RESULTS AND DISCUSSION

In this study, 23 respondents have answered the questions verbally and also in the questionnaires. There were 18 questions based on the individual respondent data and the review of the house condition after the handover process by the developer. In addition, these respondents were chosen because they have already taken the keys and the complaint period is still in progress. The individual respondent data is shown in Table 1.

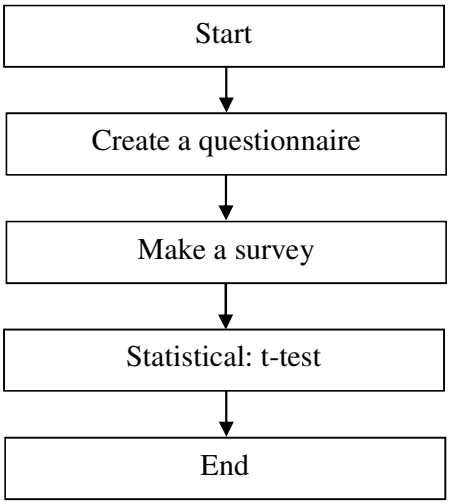

Figure 1: Flow chart

Table 1: Individual respondent data

GENDER	Male	61%
	Female	39%
AGE	20 - 29	0%
	30 - 39	61%
	40 - 49	22%
	50 - 59	13%
	60 +	4%
EDUCATION	Less than high school	4%
	High school	4%
	Certificate	13%
	Diploma	13%
	Degree	49%
	Master degree	13%
	Doctorate degree	4%
EMPLOYMENT	Government servant	35%
	Private sectors	22%
	Professional	4%
	Academic	17%
	Technical expert	4%
	Others	18%

From Table 2.1 and 2.2, there are differences of mean for customer satisfaction among respondents. It indicates that the mean for strongly agree = .0435, disagree = .3043, neutral = .2174, agree = .4348 and strongly agree = .0000. This means there is no significant difference for the mean score of customer satisfaction for external and internal view for all respondents.

From Table 3, it shows that the mean is the same as for each of the statements. However in this analysis, there is an important warning at the strongly disagree statement where it mean is .0435. One good assumption is that, there was a respondent who strongly disagree about the satisfaction on the specification of materials comparing the legal binding brochure that was produced by developer.

Table 2.1: I am satisfied with external view of the house after handover process

	N	Mean	Std. Deviation	Std. Error Mean
Strongly Disagree	23	.0435	.20851	.04348
Disagree	23	.3043	.47047	.09810
Neutral	23	.2174	.42174	.08794
Agree	23	.4348	.50687	.10569
Strongly Agree	23	.0000	.00000[a]	.00000

Table 2.2: I am satisfied with internal view of the house after handover process

	N	Mean	Std. Deviation	Std. Error Mean
Strongly Disagree	23	.0435	.20851	.04348
Disagree	23	.3043	.47047	.09810
Neutral	23	.2174	.42174	.08794
Agree	23	.4348	.50687	.10569
Strongly Agree	23	.0000	.00000[a]	.00000

Table 3: I am satisfied with the type and specification of materials according to developer's legal binding brochure and same as during handover process

	N	Mean	Std. Deviation	Std. Error Mean
Strongly Disagree	23	.0435	.20851	.04348
Disagree	22	.3182	.47673	.10164
Neutral	23	.2609	.44898	.09362
Agree	23	.3913	.49901	.10405
Strongly Agree	23	.0000	.00000[a]	.00000

Table 4 shows the respondents' satisfaction in terms of the value of money. The statically significant relationship between the four categories is scattered for each other. There is still a dissatisfied respondent where the mean of strongly disagree is .0435.

Table 4: I am satisfied with value of money of the house after handover process

	N	Mean	Std. Deviation	Std. Error Mean
Strongly Disagree	23	.0435	.20851	.04348
Disagree	23	.3478	.48698	.10154
Neutral	23	.1739	.38755	.08081
Agree	23	.4348	.50687	.10569
Strongly Agree	23	.0000	.00000[a]	.00000

The statistical analysis on the safety issue is shown in Table 5. The highest mean is in the agree category with the value of .3913, but for the negative feedbacks which are strongly disagree = .1304 and disagree = .2609. Respondent who is not satisfied still appears in the safety matters of the house after the handover process by the developers.

Table 5: I am satisfied with the safety matters after handover process

	N	Mean	Std. Deviation	Std. Error Mean
Strongly Disagree	23	.1304	.34435	.07180
Disagree	23	.2609	.44898	.09362
Neutral	23	.1739	.38755	.08081
Agree	23	.3913	.49901	.10405
Strongly Agree	23	.0435	.20851	.04348

As can be seen from Table 6.1 and 6.2, by default the strongly disagree in customer satisfaction for the overall external and internal defects is still felt by the respondent. The mean for the overall external defects is higher than the internal defects which are .0870 and .0435 respectively.

Table 6.1: I am satisfied with overall external defects at house building

	N	Mean	Std. Deviation	Std. Error Mean
Strongly Disagree	23	.0870	.28810	.06007
Disagree	23	.2609	.44898	.09362
Neutral	23	.2174	.42174	.08794
Agree	23	.4348	.50687	.10569
Strongly Agree	23	.0000	.00000[a]	.00000

Table 6.2: I am satisfied with overall internal defects at house building

	N	Mean	Std. Deviation	Std. Error Mean
Strongly Disagree	23	.0435	.20851	.04348
Disagree	23	.3478	.48698	.10154
Neutral	23	.1739	.38755	.08081
Agree	23	.3913	.49901	.10405
Strongly Agree	23	.0435	.20851	.04348

The respondent reaction to the developer representatives is shown in Table 7.1 and 7.2, respectively. Based on the data, most of the respondents agree that the developer representative is making an outstanding works during the defect complaint period. This

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statement is concrete because there was no negative feedbacks given by the respondents especially strongly disagree for developer representatives.

Table 7.1: I am satisfied with developer representatives

	N	Mean	Std. Deviation	Std. Error Mean
Strongly Disagree	23	.0000	.00000[a]	.00000
Disagree	23	.1304	.34435	.07180
Neutral	20	.6000	.50262	.11239
Agree	22	.3182	.47673	.10164
Strongly Agree	23	.0435	.20851	.04348

Table 7.2: I am satisfied with developer representative are well trained

	N	Mean	Std. Deviation	Std. Error Mean
Strongly Disagree	23	.0435	.20851	.04348
Disagree	23	.0870	.28810	.06007
Neutral	23	.5652	.50687	.10569
Agree	23	.2609	.44898	.09362
Strongly Agree	23	.0435	.20851	.04348

Table 8.1 and 8.2 show the respondents feeling on the rectification works with PBT's requirements and the developer manage to solve all the inquiries according to Sale and Purchase Agreement, respectively. In PBT's requirement, it indicates that the mean for strongly disagree = .0870, disagree = .2174, neutral = .4348, agree = .2609 and strongly agree = .0000. According to this data, no respondent strongly agrees that rectification works done by the developer followed the PBT's regulation. In the Sale and Purchase Agreement, it also shows that there is no respondent that strongly agree on developer answers all the inquiries following the agreement.

Table 8.1: I am satisfied with the developer rectification works and they followed PBT's requirements

	N	Mean	Std. Deviation	Std. Error Mean
Strongly Disagree	23	.0870	.28810	.06007
Disagree	23	.2174	.42174	.08794
Neutral	23	.4348	.50687	.10569
Agree	23	.2609	.44898	.09362
Strongly Agree	23	.0000	.00000[a]	.00000

Table 8.2: I am satisfied with developer to solve all my inquiries according to the Sale and Purchasing Agreement

	N	Mean	Std. Deviation	Std. Error Mean
Strongly Disagree	23	.0435	.20851	.04348
Disagree	23	.2609	.44898	.09362
Neutral	23	.4783	.51075	.10650
Agree	23	.2174	.42174	.08794
Strongly Agree	23	.0000	.00000[a]	.00000

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At the end of the survey, the question asked to the respondents was whether they will recommend their friend to buy a new house built by this developer. The data are shown in Table 9. It indicates that strongly disagree = .1739, disagree = .1739, neutral = .3478, agree = .3043 and strongly agree = .0000. From this data, it is clearly stated that the differences between all categories do not have very much difference and it means the entire respondents have their own reason to recommend or vice versa to their friend.

Table 9: I am satisfied with the overall quality and will recommend to my friends

	N	Mean	Std. Deviation	Std. Error Mean
Strongly Disagree	23	.1739	.38755	.08081
Disagree	23	.1739	.38755	.08081
Neutral	23	.3478	.48698	.10154
Agree	23	.3043	.47047	.09810
Strongly Agree	23	.0000	.00000[a]	.00000

The Correlation analysis is used to describe the relationships and directions between two variables. Table 10 shows the result for the Pearson Correlation. According to the Pearson theory, the range of *r* is from -1 to +1, and because of that if one variable increases, the other variable will also increase. In this table, four categories have shown the negative correlation among others. It means that there is a significant relationship between two variables, which are to disagree and agree. Based on these data, the respondents shown that they do not have any interest on whether they should recommend this house to their friend.

Table 10: Correlations of the recommendation to friend

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Strongly Disagree	Pearson Correlation	1	-.211	-.335	-.303	.[a]
	Sig. (2-tailed)		.335	.118	.159	.
	N	23	23	23	23	23
Disagree	Pearson Correlation	-.211	1	-.335	-.303	.[a]
	Sig. (2-tailed)	.335		.118	.159	.
	N	23	23	23	23	23
Neutral	Pearson Correlation	-.335	-.335	1	-.483*	.[a]
	Sig. (2-tailed)	.118	.118		.020	.
	N	23	23	23	23	23
Agree	Pearson Correlation	-.303	-.303	-.483*	1	.[a]
	Sig. (2-tailed)	.159	.159	.020		.
	N	23	23	23	23	23
Strongly Agree	Pearson Correlation	.[a]	.[a]	.[a]	.[a]	.[a]
	Sig. (2-tailed)	.	.	.	.	
	N	23	23	23	23	23

4.0 CONCLUSSION

This study focused on the customer satisfaction of bungalow houses, Melaka. There were 23 respondents that answer all the questions given. According to the data collection, most of the respondents are not satisfied with the quality of the house built neither external nor internal view after handover process. Most of the respondents are also not satisfied about all the inquiries that have been reported to the developer during the defect complaint period. However, they agree that the developer representatives are well trained and have a good understanding to counter this problem.

There are several recommendations that can be followed as a guideline to the developer to give satisfaction to new house buyer after handover process.

i. Developer should make a quality checking not less than two times before the handover process.
ii. Developer should hire a professional architect to check and balance the house building until the end process which is called as Certificate of Completion and Compliance (CCC).
iii. Developer should allow buyer to enter the construction site during develop the new house.
iv. Developer should train the workers to become a professional and skill workers.

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