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Modelling Customers' Perception of the Quality of Services Provided by Builders: A Case of Victoria, Australia

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Abstract

Consumer satisfaction is essential for quality assurance, business survival and economic prosperity. It can also be used as an indicator of the occurrence of defects in the houses delivered by builders. The objective of this study is to compare the quality of services provided by volume and small builders, and to develop a model for predicting the chance of occurrence of structural defects in houses. A list of home builders was obtained from Australia's Housing Industry Association media release 2019. Thereafter, customer reviews of 10 volume builders and 107 small builders were obtained from publicly available data. Overall, 2336 reviews for volume-builders and 2037 reviews for small builders were analysed quantitatively. Further, using the scores provided by customers, the probability-based regression model for the structural integrity of residential buildings was developed. Generally, the research found that for volume-builders, customers have the highest satisfaction level for 'customer service' and the lowest satisfaction level for 'plumbing and waterproofing' work. However, for small builders, customers have the highest confidence in the 'structural integrity' of their buildings and the least confidence in projects 'timeliness'. Clients can use the stochastic-based model to predict the probability that a builder could deliver a house with low structural defects. The model showed that if a customer service score for a particular builder is less than 3.3, then there is a higher chance of having structural defects. This research contributes to the body of knowledge by developing and validating the logistic regression model that can be used as a tool

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to assess the quality of services provided by home builders. Moreover, the research provides useful information which can assist builders to improve the quality of services they provide.

Keywords

Volume Builders; Small Builders; Quality Indicators; Customer Satisfaction; Logistic Regression; Structural Integrity; Building Defects

Introduction

Consumer satisfaction is no longer a novel concept in terms of quality assurance and consistency of product, it is now an integral part of many businesses' policies and practice. It is defined as "the number of customers, or percentage of total customers, whose reported experience with a firm, its products, or its services (ratings) exceeds specified satisfaction goals" (Farris, et al., 2006). Collection of this type of data has been tried and tested in the marketing sector for years as it has proven to provide a solid indication of consumers' intentions and loyalties and business performance (Farris, et al., 2006).

For consumers, the construction of their home is often the single largest investment in their lifetime. Thus, to help consumers make the right decision about who to build with, adequate information needs to be made available (McGregor, 2006). Consumers are becoming savvier and more diligent regarding builder selection driven by the plethora of readily available information online such as articles, reports, reviews, and ratings. Research has shown that 50% of consumers procure because of product trust which is generally established by two sources: online information via reviews and ratings, and family and friends via 'word-of-mouth' (Perkins and Fenech, 2014). Platforms exist to provide a place for existing consumers of different goods and services to share their experiences honestly, and to a public forum. The suppliers or service providers are usually given an aggregated rating out of 5 stars from the consumers that use this platform over a variety of criteria (site administration, timeliness, plumbing and waterproofing, flooring, structural integrity, electrical and lighting and transparency) (ProductReview, 2020). The purpose of these platforms is not to defame brands, but to provide data to future consumers who wish to build their home. Further, the platforms assist builders to adopt business improvement strategies in terms of matching products against client expectations and to improve the services which are essential to enriching general customer satisfaction (Leung, Ng and Cheung, 2004).

Various tools for assessing homebuyer's satisfaction have been developed. For instance, Torbica and Stroh (2000) proposed HOMBSAT, a tool which can provide total home-buyer satisfaction. Tang, Lu and Chan (2003) studied client satisfaction using a questionnaire-based survey. In the context of Victoria, Australia, Galluzzo, Sagoo and Scott-Young (2017) identified factors influencing the housing quality such as demand and supply of housing, marketing, sales through to site completion, building inspections and audits, supply chain relationships, after-sales service, project planning and control and competency of site supervisors. However, there lacks a tool or model that can be used to predict the probability that a certain builder can deliver good quality services in terms of structural integrity, quality of flooring, plumbing fit-off and related criteria. On the other hand, the Victorian Building Authority (2014) concluded that 5.3% of new homes constructed between 2003 and 2011 had shown some forms of distress including cracks in floors and walls. Hence, a model for structural integrity is proposed. The model can help consumers to make the right decision while selecting home builders. Thus, the objectives of this research are:

- To compare customers' ratings of volume and small builders and rank the criteria of the customer's satisfaction.
- To develop a logistic regression model for predicting the chance of occurrence of structural defects in houses.

In this research context, 'volume builder' refers to a builder that constructs more than 150 homes per year (Housing Industry Association (HIA), 2021), whereas 'small builder' refers to builders that deliver less than or equal to 150 homes per annum.

Literature review

The level of stakeholder satisfaction directly influences the current project and subsequent projects and the level of satisfaction experienced by other stakeholders (Yang and Peng, 2008). Moreover, Forsythe (2016) conducted a study to see if service quality impacts customer satisfaction during construction and found that customer satisfaction is closely related to perceptions of service quality. Chevalier and Mayzlin (2006) mentioned that customer reviews can have a positive influence on sales (Chevalier and Mayzlin, 2006). Clemons, Gao and Hitt (2006) found that strongly positive ratings can confidentially influence the growth of product sales. Similarly, Chen and Xie (2005) found that the quality of the review encourages sales. Hence, it is essential to analyse previous customers reviews before making decisions.

Earlier studies have identified various client-satisfaction factors. For instance, Ahmed and Kangari (1995) conducted a survey of 101 client companies and identified the important factors for client-satisfaction modelling which include time, cost, quality, client orientation, communication skills and response to complaints. The study showed that all the factors identified in the client-satisfaction model do not possess the same significance when it comes to satisfying clients. Liu (1999) studied to understand the residential satisfaction of housing estates in Hong Kong using questionnaires comprising nine dimensions. The dimensions comprise aesthetics, location, use of space, building enclosure, amenities, health (personal and environmental), safety and security, social needs and miscellaneous. The study developed the post-occupancy evaluation (POE) method for measuring customer satisfaction.

Additionally, Torbica and Stroh (2000) developed an instrument, called HOMBSAT for assessing home-buyer satisfaction. HOMBSAT comprises three distinct dimensions of house design, house and services. According to the authors, the indicators of house design are used to rate the product quality of a transaction, whereas the indicators of services are used to rate the service quality. As per Torbica and Stroh (2000), HOMBSAT can provide a total home-buyer satisfaction across three dimensions to the home builders to track the overall quality of their services.

On the other hand, Maloney (2002) argued that the physical product and service delivery must be considered when assessing customer satisfaction in the construction industry. The author proposed five dimensions of customer satisfaction for contractors: contractor/customer relationship, project management, safety, prepared/skilled workforce and cost. The study concluded that on-time performance is a factor that is likely to be of importance on any project, but it may be more important on some projects than others.

Further, Tang, Lu and Chan (2003) studied client satisfactions of engineering consulting firms in Hong Kong using a questionnaire-based survey. Their study used eight factors to evaluate the overall client satisfaction: professionalism of service; competitiveness of service; timeliness of service; quality of design; the degree of innovation; completeness of other considerations; availability of support for a client; and supervision at implementation. Tang, Lu and Chan (2003) suggested that one important strategy for achieving client satisfaction is the proactive attitudes towards attaining professionalism of service and delivering faultless service to the client rather than reactive measures taken to remedy drawbacks subsequent to their occurrence. Leung, Ng and Cheung (2004) measured construction project participant satisfaction through 15 established and verified hypotheses. The study showed that management mechanisms (communication, participation and commitment) rather than particular project goals (time, cost and quality) directly influence participant satisfaction.

Moreover, Forsythe (2008) developed a theoretical model to understand how service quality impacts the perceptions of customers in housing construction. The study showed that customers make service quality

judgements progressively during the design and construction process, rather than waiting for the end product to emerge. Besides, Forsythe (2012) developed a pre-purchase decision process model by analysing data obtained from telephone interviews using thematic and comparative analysis techniques.

Research methodology

According to Duffy (2002), web-based research provides many advantages such as access to specific, sometimes difficult-to-find populations; the speed of data access; and decreased costs for data collection and data entry. Thus, online customer reviews and ratings can be considered as web-based research, with the above-mentioned benefits. This research used customer reviews and ratings, and the target population were builders (volume and small) operating in the Australian state of Victoria (ProductReview, 2020).

Mudambi and Schuff (2010) mentioned that retail websites offer consumers the opportunity to post product reviews with content in the form of numerical star ratings (usually ranging from 1 to 5 stars) and open-ended customer-authored comments about the product. Several sites that provide consumer ratings have emerged in speciality areas (Dabholkar, 2006). ProductReview.com.au is one of the popular websites which provide customer reviews and ratings of builders, and this study used the information available on ProductReview.com.au (ProductReview, 2020). Customer satisfaction ratings of 10 volume builders and 107 small builders operating in the Australian state of Victoria were analysed. The total number of customers who provided their opinions regarding the services of builders was 4373 of which 2336 opinions corresponded to volume-builders and, 2037 to small builders.

The online customers' review portal, ProductReview.com.au, has been chosen to carry out this study because it offers opinions based on the experiences of real clients and, therefore, it can be considered a powerful source of reliable and adequate information. On ProductReview.com.au, customers rate builders based on eight criteria by using a 5-point scale (1 = very poor, 2= poor, 3= acceptable, 4 = good and 5 = very good). The scores apply to (1) site administration (SA), (2) customer service (CS), (3) timeliness (T), (4) structural integrity (SI), (5) plumbing and waterproofing (PW), (6) electrical and lighting (EL), (7) flooring (F) and (8) transparency (Tr).

The descriptions of the variables (criteria) are provided as follows. Site Administration: how well managed was your building process which includes site works, communication and administration; Customer Service: the level of assistance provided by a company to customers; Timeliness: the ability to finish the building on time; Structural Integrity: how was the workmanship and quality of building structure? Plumbing and Waterproofing: how was the workmanship and quality of plumbing and waterproofing? Electrical and Lighting: how was the workmanship and quality of electrical and lighting? Flooring: how was the workmanship and quality of flooring? Transparency: how open, honest and informative a company is regarding its business practice.

Rodríguez-Díaz, Rodríguez-Díaz and Espino-Rodríguez (2018) developed an equation to analyse customers' online social communication to rate lodgings and tourist destinations. Likewise, Rodríguez-Díaz and Espino-Rodríguez (2018) proposed a methodology for a comparative analysis of the lodging offer of tourism destinations based on online customer reviews. Based on the methods proposed in previous studies, Equation 1 was developed to analyse the online customer ratings of the services of home builders. This equation is used to determine the score or rating which can be used to compare customers' satisfaction levels of small builders and volume builders.

$$OR = \frac{(SA * n_{sa} + CS * n_{cs} + T * n_t + SI * n_{si} + PW * n_{pw} + EL * n_{el} + F * n_f + Tr * n_{tr})}{(n_{sa} + n_{cs} + n_t + n_{si} + n_{pw} + n_{el} + n_f + n_{tr})} \quad (1)$$

In Equation 1, OR is an overall rating; SA is rating for site administration, n_{sa} is the number of customers who provided reviews regarding site administration; CS is rating for customer service, n_{cs} is the number of customers who provided reviews regarding customer service; T is rating for timeliness, n_t is the number of customers who provided reviews regarding timeliness; SI is rating for structural integrity, n_{si} is the number of customers who provided reviews regarding structural integrity; PW is rating for plumbing and waterproofing, n_{pw} is the number of customers who provided reviews regarding plumbing and waterproofing; EL is rating for electrical and lighting, n_{el} is the number of customers who provided reviews regarding electrical and lighting; F is rating for flooring, n_f is the number of customers who provided reviews regarding flooring; and Tr is rating for transparency and n_{tr} is the number of customers who provided reviews regarding customer service.

Descriptive statistical analysis, normality test, Friedman and Wilcoxon tests were also carried out before conducting regression analysis. Logistic regression analysis was conducted to build a model that can be used in predicting the probability of having lower structural defects based on the customers' services satisfaction level. Structural integrity was modelled since the variable is significant in choosing builders. Previous studies conducted in Victoria, Australia, showed that cracks in the structure of the homes are the most common defects (Gurmu, Krezel and Mahmood, 2020). Hence, structural integrity was chosen for further analysis.

Before building the model, the suitability of the sample for the logistic regression analysis was checked by computing the number of events per variable (EPV). The rule of thumb for the sample size for logistic regression analysis is that EPV should be greater than 10 (Peduzzi, et al., 1996). However, some authors argue that a minimum of 10 events per predictor is conservative (Vittinghoff and McCulloch, 2007), in this research, the number of positive events refers to the number of builders that are rated as four and five stars, and there is one predictor. The EPV value of 91, which is greater than 10, was obtained. Thus, the data was suitable to run a logistic regression analysis.

In logistic regression analysis, random sample splitting and K-fold cross-validation techniques can be used to divide the data into model building and validation datasets (Steyerberg, et al., 2001). In this study,

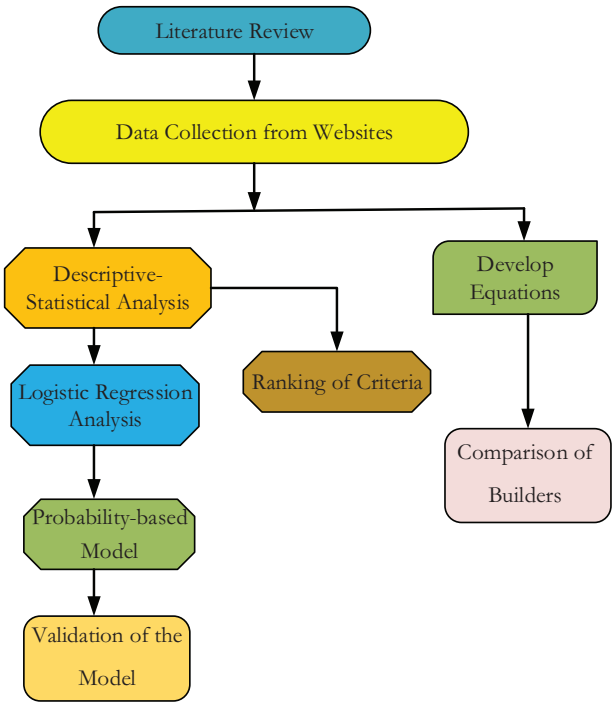

Figure 1. Research Flowchart

a 3-fold cross-validation technique was used as it is less biased than the sample splitting method (Abou-Assaleh, et al., 2004). Alternative models using the 3-fold cross-validation techniques were developed and compared before choosing the final model. The criteria for selection include the overall prediction accuracy and statistical significance of the variables in the model.

To validate the logistic regression model, the probabilities of validation data sets were computed; structural integrity scores were predicted as binary values (1,0) and compared with the actual structural integrity scores; Receiver Operating Characteristic (ROC) curve was drawn and compared with the reference line, and area under the ROC curve (AUC) was computed. According to Gurmu (2019), the AUC is interpreted as acceptable if the graph is above the reference line and AUC exceeds 0.5. To check the reliability of the logistic regression model, bootstrapping using 10000 samples was conducted. This confirms Willems and Van Aelst (2005) findings that the use of 10000 or more samples provides accurate output in bootstrapping. Figure 1 shows the flowchart for the research processes which were discussed above.

Findings and Discussions

The descriptive data analysis of the indicators of customer satisfaction for both small and volume builders are presented in Table 1 (please refer Appendix section for the raw data). Accordingly, for small builders, 'customer service' has the highest mean value of 4.52, and 'timeliness' has the lowest mean value of 4.38 (Table 1). For volume builders, 'customer service' has the highest mean value of 4.47 and 'plumbing and waterproofing' has the lowest mean value of 4.28.

Table 1. Descriptive Statistics of Customers Ratings

Small Builders							
Variables	Range Statistic	Minimum Statistic	Maximum Statistic	Mean		Std. Deviation Statistic	Variance Statistic
				Statistic	Std. Error		
Site Administration	4	1	5	4.45	.012	.571	.326
Timeliness	4	1	5	4.38	.013	.587	.345
Plumbing and waterproofing	4	1	5	4.40	.013	.529	.280
Flooring	4	1	5	4.51	.011	.486	.236
Structural Integrity	3	2	5	4.53	.013	.490	.240
Electrical and lighting	4	1	5	4.50	.011	.449	.202
Customer service	4	1	5	4.52	.010	.533	.284
Transparency	4	1	5	4.44	.011	.525	.276

Table 1. continued

Volume Builders							
Variables	Range Statistic	Minimum Statistic	Maximum Statistic	Mean		Std. Deviation Statistic	Variance Statistic
				Statistic	Std. Error		
Site Administration	1.00	3.70	4.70	4.32	.005	0.252	.063
Timeliness	1.10	3.60	4.70	4.34	.007	0.373	.139
Plumbing and waterproofing	1.00	3.70	4.70	4.28	.006	0.241	.058
Flooring	1.00	3.70	4.70	4.38	.006	0.249	.062
Structural Integrity	1.10	3.70	4.80	4.41	.005	0.227	.051
Electrical and lighting	1.00	3.80	4.80	4.37	.005	0.227	.051
Customer service	0.80	4.00	4.80	4.47	.0055	0.328	.108
Transparency	0.90	3.80	4.70	4.32	.0053	0.288	.083

Normality test was conducted to decide whether to use parametric or non-parametric tests to make statistical commentary regarding the significance of the differences among the weights of the 8 indicators of the customers' satisfaction. If assumptions of the parametric test (for instance, normality) are fulfilled, 'repeated measures ANOVA' will be used, or else the Friedman test which is non-parametric will be adopted. In the normality test, the null hypotheses of the Shapiro-Wilk test, which states 'the data is normally distributed' will be rejected if p-values are less than 5% (Islam and Tarefder, 2014). Accordingly, the normality test was conducted using SPSS 26, and all the p-values of the Shapiro-Wilk test were found to be less than 0.05 (Table 2) indicating that the data is not normally distributed. Thus, non-parametric test or Friedman test was used to analyze the differences among the weights of the criteria.

Table 2. Tests of Normality of Data for Volume and Small Builders

Small Builders						
	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Site Administration	.326	1465	.000	.747	1465	.000
Timeliness	.179	1465	.000	.916	1465	.000
Plumbing and waterproofing	.281	1465	.000	.810	1465	.000
Flooring	.299	1465	.000	.759	1465	.000

Table 2. continued

Small Builders						
	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Structural Integrity	.301	1465	.000	.677	1465	.000
Electrical and lighting	.258	1465	.000	.850	1465	.000
Customer service	.289	1465	.000	.813	1465	.000
Transparency	.235	1465	.000	.878	1465	.000
Volume Builders						
Site Administration	.234	1719	.000	.805	1719	.000
Timeliness	.291	1719	.000	.849	1719	.000
Plumbing and waterproofing	.308	1719	.000	.836	1719	.000
Flooring	.245	1719	.000	.833	1719	.000
Structural Integrity	.228	1719	.000	.743	1719	.000
Electrical and lighting	.364	1719	.000	.782	1719	.000
Customer service	.272	1719	.000	.838	1719	.000
Transparency	.229	1719	.000	.853	1719	.000

The Friedman test for the 8 customer satisfaction indicators was conducted and a p-value of less than 0.001 was obtained (Table 3 and Table 4). The finding implies that there are significant differences among the weights of the indicators. Thus, the null hypothesis which states 'the weights of the eight customer satisfaction indicators are equal' was rejected. However, as the Friedman test is not suitable to identify where the difference lies, posthoc analysis or Wilcoxon test was conducted. Wilcoxon test was chosen since it is the most suitable test after analyzing data using Friedman test (Pereira, Afonso and Medeiros, 2015).

The results of Wilcoxon test for small builders (Table 3) indicate that the null hypothesis which states 'the weights of Site Administration and Flooring' is the same was accepted since the p-value exceeds 0.05 ($p=0.27>0.05$). Similarly, the null hypothesis for 'the equality of weight of Site Administration and Transparency' was not rejected since $p=0.61>0.05$. Furthermore, $p=0.71$ for Timeliness and Electrical and Lighting; $p=0.37$ for Flooring and Structural Integrity; $p= 0.95$ for Flooring and Transparency; and $p= 0.55$ for Structural Integrity and Transparency were obtained (Table 3). The findings imply that there are no significant differences between the weights of Site Administration and Transparency, Site Administration and Flooring, Timeliness and Electrical and Lighting, Flooring and Structural Integrity, and Structural Integrity and Transparency. This shows that customers' satisfaction level among the forementioned criteria does not vary. However, there are significant differences among the 22 combinations that are indicated in bold in Table 3. For instance, there is a significant difference between the top two factors 'Structural Integrity' and 'Flooring' (refer Table 5 for the rank of the factors).

Table 3. Outputs of Friedman and Wilcoxon Tests – Small Builders

Friedman Test								
	Mean Rank	Chi-Square	df	Asymp. Sig.				
Site Administration	4.83	1701.399	7	.000				
Timeliness	4.16							
Plumbing and waterproofing	2.83							
Flooring	4.69							
Structural Integrity	4.86							
Electrical and lighting	3.86							
Customer service	6.21							
Transparency	4.56							
Wilcoxon Test								
	SA	T	PW	F	SI	EL	C	Tr
Site Administration	-	**0.000**	**0.000**	0.272	**0.000**	**0.000**	**0.000**	0.612
Timeliness	-	-	**0.000**	**0.000**	**0.000**	0.706	**0.000**	**0.000**
Plumbing and waterproofing	-	-	-	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Flooring	-	-	-	-	0.365	**0.000**	**0.000**	0.953
Structural Integrity	-	-	-	-	-	**0.000**	**0.000**	0.553
Electrical and lighting	-	-	-	-	-	-	**0.000**	**0.000**
Customer service	-	-	-	-	-	-	-	**0.000**
Transparency	-	-	-	-	-	-	-	-

Notes: SA= Site Administration, T= Timeliness, PW= Plumbing and waterproofing, F= Flooring, SI= Structural Integrity, EL= Electrical and lighting, C= Customer service and Tr= Transparency

The results of the Wilcoxon test for volume builders (Table 4) indicate that the null hypothesis which states "the weights of 'Timeliness' and 'Plumbing and Waterproofing' is the same" was accepted since the p-value exceeds 0.05 (p=0.25>0.05). The finding shows that there is no significant difference between the weights of 'Timeliness' and 'Plumbing and Waterproofing'. However, there are significant differences among the 27 combinations that are indicated in bold in Table 4. For example, there is a significant difference between the top three factors: Customer Service, Structural Integrity and Flooring (refer Table 5 for the rank of the factors).

Table 4. Outputs of Friedman and Wilcoxon Tests – Volume Builders

Friedman Test								
	Mean Rank	Chi-Square	df	Asymp. Sig.				
Site Administration	4.36	3025.911	7	.000				
Timeliness	4.30							
Plumbing and waterproofing	4.10							
Flooring	5.75							
Structural Integrity	6.04							
Electrical and lighting	5.48							
Customer service	3.08							
Transparency	2.89							
Wilcoxon Test								
	SA	T	PW	F	SI	EL	C	Tr
Site Administration	-	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Timeliness	-	-	0.250	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Plumbing and waterproofing	-	-	-	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Flooring	-	-	-	-	**0.000**	**0.000**	**0.000**	**0.000**
Structural Integrity	-	-	-	-	-	**0.000**	**0.000**	**0.000**
Electrical and lighting	-	-	-	-	-	-	**0.000**	**0.000**
Customer service	-	-	-	-	-	-	-	**0.000**
Transparency	-	-	-	-	-	-	-	-

Notes: SA= Site Administration, T= Timeliness, PW= Plumbing and waterproofing, F= Flooring, SI= Structural Integrity, EL= Electrical and lighting, C= Customer service and Tr= Transparency

The weights and ranks of the 8 customer satisfaction indicators for small and volume builders are presented in Table 5. Accordingly, structural integrity, flooring and customer service were found to be the top three factors for small builders. The results of the Wilcoxon Test (Table 3) also shows that there is a statistically significant difference between the weights of the top two factors 'structural integrity' and 'flooring.' This implies that the perception of customers regarding the quality of flooring and the structural integrity of the buildings is different, and consumers are more confident in the structural integrity than in the floorings of the buildings constructed by the small builders. On the other hand, customers perceive that small builders did not complete projects within the agreed time.

Table 5. Weights and Ranks of Customer Satisfaction Indicators

Small Builders		
Indicators	Weight	Rank
Structural Integrity	4.533	1
Flooring	4.520	2
Customer Service	4.518	3
Electrical & Lighting	4.499	4
Site Admin	4.445	5
Transparency	4.441	6
Plumbing & Waterproofing	4.395	7
Timeliness	4.377	8
Volume Builders		
Customer Service	4.4673	1
Structural Integrity	4.4056	2
Flooring	4.3805	3
Electrical & Lighting	4.3717	4
Timeliness	4.3427	5
Site Admin	4.3164	6
Transparency	4.3159	7
Plumbing & Waterproofing	4.2400	8

In Table 5, the results of the weights of the indicators of customers' satisfaction for volume-builders operating in the Australian state of Victoria are presented. Accordingly, customer service was perceived as the most important factor. This shows that customers were very happy with the customers' services provided by volume builders. The structural integrity and flooring were ranked in the top three with the weights of 4.41 and 4.38, respectively. Nonetheless, the finding indicates that customers were not satisfied with the plumbing and waterproofing works executed by the volume builders.

Timeliness was ranked last (8th) for small-builders, whereas 'plumbing and waterproofing' was ranked last (8th) for volume-builders (Table 5). This implies that the project delivery time for volume-builders is better than that of small builders. One of the reasons could be related to resource availability. Since volume builders have better financial capacity and larger economies of scale with regards to purchasing power than small builders, they can purchase and deliver construction materials in a shorter period of time. Nonetheless, small builders may not have the capacity to pay for labour and materials in a timely manner, and the progress of the project may be impacted.

To compute the overall satisfaction scores of volume and small builders, Equation 1 was used and the Overall Rating (OR) for small builders was found to be 4.47. Similarly, the OR value for volume builders was calculated to be 4.37. Although the two scores did not vary significantly, the finding indicates that customers are more satisfied with small builders than volume builders. Whereas customer service was ranked 1st for volume builders, it was ranked 3rd for small builders. This implies that the customer service of the volume builders is better than that of small builders. This could be due to the experience of volume builders in handling numerous customers as well as the higher financial capacity of the volume builders. Further, volume builders could have better financial capacity to employ dedicated customer service officers.

Model building

Before running the logistic regression, random numbers using Microsoft Excel was assigned to each data point so that the data can be randomly distributed. Based on the random numbers, the data was sorted in ascending order from 1 to 117. The data was then split into model building and validation datasets. In the first trial, the data points ranging from 1-39 and 79-117 were used in model building whereas the data points from 40-78 were kept for validation purposes. In the second trial, data points 40-78 and 79-117 were used in model development and data points1-39 were kept as validation dataset. Finally, in the third trial, data points 1-39 and 40-78 were used in the analysis, and data points 79-117 were considered as validation data set.

Three alternative models using the 3-fold cross-validation technique were developed, and the best model is selected. Among the three models, a model with better predictive accuracy (89.7%) and a statistically significant coefficient is chosen. Accordingly, data points from 1-39 and 79-117 were used for model building, and data points from 40-78 were used for validation purposes. The results of the logistic regression analysis of the best model are presented in Figure 2.

In Block-0, the true negative percentage of 100.0%, the true positive percentage of 0.0%, and the overall model accuracy of 80.8% were found. The variable in the equation was significant ($p=0.001<0.05$) and the variable not in the equation was also significant ($p=0.001<0.05$). In Block-1, the Chi-square (43.97) of the Omnibus test was significant ($p=0.001<0.05$) which shows that the model is better than the null model (Block-0). The Hosmer and Lemeshow test showed $p=0.88>0.05$ which implies the model in Block-1 is good. The overall prediction accuracy of the model was 89.7%, and the value is greater than the null model's prediction accuracy (80.8%). The true negative prediction accuracy of the model was 53.3%, and the true positive prediction accuracy was 98.4%. Wald Chi-square (8.1) for the variable in the equation was statistically significant ($p=0.004<0.05$). Similarly, the Wald Chi-square (6.1) for the constant was statistically significant ($p=0.014<0.05$). The Exp(B) for the variable was 20.79 which indicates that for one unit increase in the score of the 'customer service', the odd of increasing the quality of structure increases by a factor of 20.79.

The output of the reliability analysis using bootstrapping is also presented in Figure 2. Accordingly, the p-values of both the variable ($p=0.03<0.05$) and the constant ($p=0.009<0.05$) were found to be statistically significant. The coefficient and the constant obtained after bootstrapping was similar to the model's coefficient and constant. Therefore, the logistic regression model is reliable.

Block-0

Classification Table

	Observed		Predicted: Structural Integrity 0	Predicted: Structural Integrity 1	Percentage Correct
Step 0	Structural Integrity	0	0	15	0
		1	0	63	100
	Overall Percentage				80.8

The cut value is 0.50

Variables in the Equation

		B	S. E	Wald	df	Sig	Exp(B)
Step 0	Constant	1.435	0.287	24.591	1	0.001	4.2

Variables not in the Equation

		Score	df	Sig.
Step 0	Structural Integrity	46.172	1	0.001
	Overall Statistics	46.172	1	0.001

Block-1

Omnibus Test for Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	43.97	1	0.001
	Block	43.97	1	0.001
	Model	43.97	1	0.001

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
Step 1	2.468	6	0.878

Classification Table

	Observed		Predicted: Structural Integrity 0	Predicted: Structural Integrity 1	Percentage Correct
Step 1	Structural Integrity	0	8	7	53.3
		1	1	62	98.4
	Overall Percentage				89.7

The cut value is 0.50

Variables in the Equation

		B	S. E	Wald	df	Sig.	Exp(B)
Step 1	Structural Integrity	3.305	1.065	8.116	1	0.004	20.794
	Constant	-10.813	4.386	6.077	1	0.014	0.001

Bootstrapping

Bootstrap

		B	Bias	SE	Sig.	95% Confidence Interval Lower	95% Confidence Interval Upper
Step 1	Structural Integrity	3.305	3.501	5.342	0.03	1.723	14.233
	Constant	-10.813	-13.794	19.86	0.009	-54.154	-4.887

Figure 2. Outputs of Logistic Regression Analysis

Finally, by using the variable's coefficient and constant indicated in Figure 2, the equation for the probability of having low structural defects and customer service is developed as shown in Equation 2 and 3.

$$\text{Log}(\text{Odds})=\text{Logit}(P_i)=\text{Ln}\left(\frac{P_i}{1-P_i}\right)=3.31CS_i-10.81 \quad (2)$$

In the equation, Pi is the probability of having low structural defects, and CS_i is Customer Service Score for an i^{th} builder. The above equation can be simplified as follows:

$$P_i=\frac{e^{3.31CS_i-10.81}}{1+e^{3.31CS_i-10.81}} \quad (3)$$

Where P_i is the probability of having low structural defects, and CS_i is Customer Service Score for an i^{th} builder. Based on Equation 3, a sigmoid graph (Figure 4) was plotted.

Model validation

To validate the logistic regression model, probabilities of validation data sets (data points from 40-78) were computed; structural integrity was predicted as binary values (1, 0) and compared with the actual structural integrity scores (Table 6). In the table, if a probability value is less than 50%, then the structural integrity is considered as 0, which implies the rating for structural integrity could be less than 4 or not good quality. A probability value more than 50% is considered as 1, which denotes the rating for structural integrity could be greater than or equal to 4 (good quality). As shown in Table 6, the model predicts about 82% of the validation data correctly.

Table 6. Validation of the Model

Probability	Predicted Structural Integrity	Actual Structural Integrity	Remark	Probability	Predicted Structural Integrity	Predicted Structural Integrity	Remark
97.65%	1.00	1.00	correct	95.56%	1.00	0.00	incorrect
74.74%	1.00	0.00	incorrect	97.65%	1.00	0.00	incorrect
96.77%	1.00	1.00	correct	88.86%	1.00	1.00	correct
74.74%	1.00	0.00	incorrect	98.78%	1.00	1.00	correct
99.67%	1.00	1.00	correct	98.30%	1.00	1.00	correct
91.74%	1.00	1.00	correct	91.74%	1.00	0.00	incorrect
93.92%	1.00	0.00	incorrect	99.67%	1.00	1.00	correct
99.36%	1.00	1.00	correct	0.05%	0.00	0.00	correct
96.77%	1.00	1.00	correct	99.67%	1.00	1.00	correct
99.67%	1.00	1.00	correct	99.67%	1.00	1.00	correct
0.05%	0.00	0.00	correct	99.67%	1.00	1.00	correct
99.67%	1.00	1.00	correct	99.67%	1.00	1.00	correct
98.30%	1.00	1.00	correct	91.74%	1.00	1.00	correct
80.46%	1.00	1.00	correct	98.30%	1.00	1.00	correct
99.36%	1.00	1.00	correct	88.86%	1.00	1.00	correct
44.10%	0.00	0.00	correct	93.92%	1.00	0.00	incorrect
99.12%	1.00	1.00	correct	93.92%	1.00	1.00	correct
91.74%	1.00	1.00	correct	99.54%	1.00	1.00	correct
99.36%	1.00	1.00	correct	99.67%	1.00	1.00	correct
0.05%	0.00	0.00	correct				
correct		**82%**					
incorrect		**18%**					

During the validation process of the model, the Receiver Operating Characteristic curve was also plotted and compared with the reference line (Figure 3). Accordingly, the curve of the graph is greater than the reference line (diagonal line) and AUC= 0.90 > 0.5. This indicates that the model is good in prediction and it is valid (Figure 3).

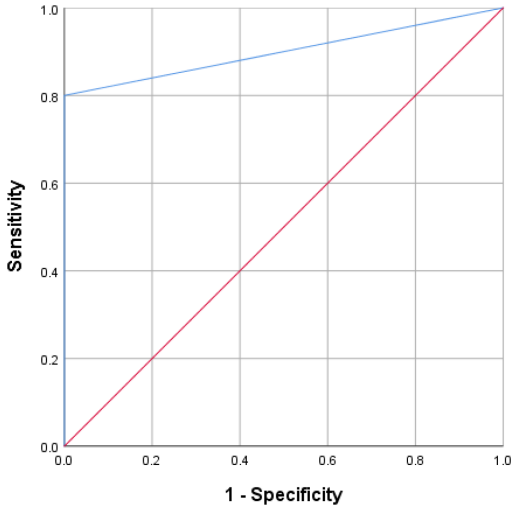

Figure 3. ROC Curve

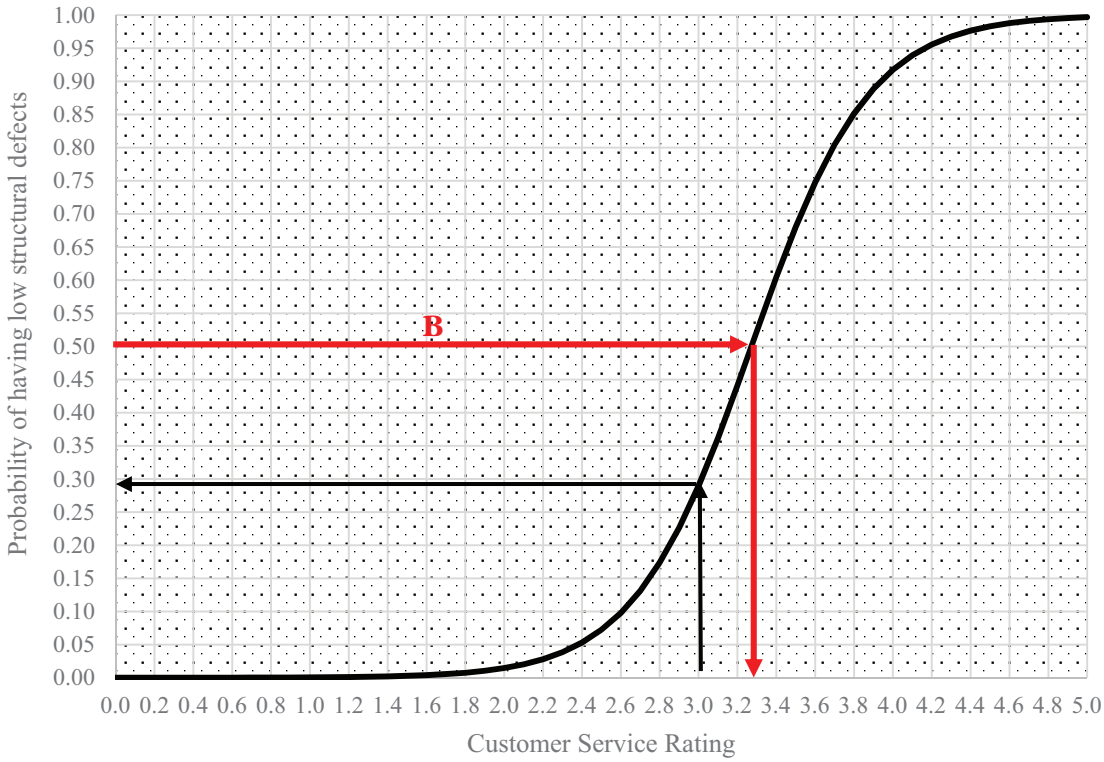

Figure 4. Sigmoid Graph of Structural Integrity

Application of the Model

The logistic regression model of structural integrity can be used as an indicator of the quality of the structure of the houses. Based on the output of the model, customers can decide whether to engage a particular builder or not. The application of the model is illustrated as follows. Suppose a customer rates a builder as '3 or acceptable' regarding the customer service and explanation of the possible structural materials, installation, certification, testing, and other associated queries. Then, from the sigmoid graph, the probability of obtaining low structural defects is 29.0% (Figure 4). This suggests that the builder might deliver the house with numerous structural defects or the quality of the structure could be lower. Thus, the client should look for an alternative builder. Generally, a probability value less than 50% (cut-off value) is not recommended. The model can also be used to determine the equivalent customer service score (3.3) for the cut-off value (50%) (please refer line B in Figure 4). This indicates that, if a customer service rating is less than 3.3, then it is suggested not to engage a particular builder since the chance of having defective structural works could be higher. Therefore, the model can assist new homeowners in choosing suitable builders.

Conclusion

This research analyzed the customer satisfaction criteria over the following variables: Customer Service, Structural Integrity, Flooring, Electrical and Lighting, Timeliness, Plumbing and Waterproofing, Site Administration, and Transparency. The ranks of the criteria were then determined. Accordingly, for small builders, structural integrity, flooring, and customer service were ranked from 1 to 3, respectively. Similarly, for volume builders, customer service, structural integrity, and flooring were ranked from 1 to 3.

Comparative analysis of the criteria with regard to the types of builders (volume vs small) was also carried out. The overall satisfaction scores of volume and small builders were found to be 4.37 and 4.47 respectively. This finding shows that, though the two scores do not vary significantly, customers are more satisfied with the service qualities of small builders than volume-builders. Based on the findings of this study, consumers can prioritize their needs and decide whether to engage a volume or small builder. Moreover, a logistic regression model which helps to predict the perceived quality of the building structure is developed and validated. Hence, customers who want to build new houses can use the model to assess the likelihood of occurrence of structural defects in their future homes.

This study has some limitations. First, the model is applicable to low-rise residential buildings, not to medium or high-rise commercial buildings. Second, models for other criteria such as plumbing, electricity were not developed for the sake of brevity. Furthermore, the analysis carried out in this research can only be used as an initial screening of home builders. The final selection of builders should include other criteria such as financial and technical capability. Future researchers can build logistic regression models for the quality of builders' services by following a similar procedure using other criteria such as waterproofing and flooring. Moreover, a comparative analysis of the quality of services delivered by builders involved in commercial and residential projects could be conducted.

Appendix

A. DATA FOR VOLUME BUILDERS

Company Code	Site Admin		Timeliness		Plumbing & Waterproofing		Flooring		Structural Integrity		Electrical & Lighting		Customer Service		Transparency		Number of houses built		
	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	2020/2019	2019/18	2018/17
1	4.5	429	4.5	420	4.5	348	4.6	333	4.6	364	4.5	350	4.3	471	4.2	401	4534	4473	4764
2	4.4	183	4.5	192	4.4	163	4.4	155	4.4	163	4.5	155	4.5	243	4.3	201	2395	2580	2500
3	3.7	148	3.7	175	3.7	109	3.7	109	3.7	115	3.8	115	4	265	3.9	208	1114	1963	2087
4	4.7	55	4.7	52	4.7	53	4.7	51	4.8	53	4.8	53	4.8	63	4.7	57	1913	1949	2153
5	4.1	333	3.9	333	4.1	301	4.1	255	4.3	302	4.1	310	4.1	374	4	304	1817	1714	2237
6	4.3	248	4.1	256	4.2	166	4.3	139	4.4	193	4.3	153	4.1	279	4	245	1493	1555	1617
7	4.5	749	4.7	876	4.4	432	4.5	484	4.5	485	4.5	484	4.8	1575	4.6	1272	1495	1473	1403
8	4.3	102	4.3	104	4.4	99	4.6	96	4.5	96	4.6	99	4.3	120	4.3	115			1205
9	3.8	109	3.6	114	3.8	75	4.2	66	4.1	81	4.3	77	4	153	3.8	99			1327
10	4.1	39	3.9	38	4	31	4.3	31	4.2	33	4.2	33	4	40	3.8	40	2332	1624	

Notes:

- Data shown in Column 2-17 were extracted from Productreview on June 3, 20200: https://www.productreview.com.au/c/home-builders
- Data shown in Column 18-20 were obtained from HIA :
  - ✓ https://hia.com.au/-/media/HIA-Website/Files/Media-Centre/Media-Releases/2020/national/hia-reveals-australia-top-home-builders-for-2019-20.ashx
  - ✓ https://hia.com.au/-/media/HIA-Website/Files/Media-Centre/Media-Releases/2018/national/hia-reveals-australias-top-homebuilders-for-2018.ashx

B. DATA FOR SMALL BUILDERS

Company Code	Site Admin		Timeliness		Plumbing & Waterproofing		Flooring		Structural Integrity		Electrical & Lighting		Customer Service		Transparency	
	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews
1	4.5	741	4.7	866	4.4	431	4.5	469	4.5	484	4.5	483	4.8	1561	4.6	1258
2	4.6	154	4.6	206	4.5	95	4.6	89	4.7	103	4.4	96	4.7	357	4.7	285
3	4.8	76	4.8	75	4.6	68	4.7	72	4.8	71	4.8	69	4.8	80	4.7	73
4	4.8	220	4.8	220	4.6	167	4.7	170	4.7	173	4.6	169	4.8	304	4.7	248
5	4.9	18	5	19	4.9	14	5	13	4.9	16	4.9	14	4.9	21	5	17
6	4.6	317	4.4	303	4.5	209	4.7	205	4.6	223	4.6	206	4.7	401	4.5	356
7	5.0	6	5	6	5	6	5	6	5	6	5	6	5	6	4.8	5
8	4.6	32	4.4	41	4.2	20	4.1	19	4.3	21	4.2	19	4.8	92	4.6	80
9	4.6	28	4.6	26	4.7	26	4.9	24	4.9	24	4.9	25	4.8	32	4.6	27
10	4.5	421	4.5	412	4.5	340	4.6	328	4.5	357	4.5	341	4.3	463	4.2	393
11	4.7	130	4.5	129	4.7	110	4.7	113	4.8	115	4.7	116	4.6	152	4.5	137
12	4.4	182	4.5	190	4.4	153	4.4	154	4.4	162	4.5	154	4.5	241	4.3	199
13	4.8	57	4.8	50	4.7	46	4.8	48	4.7	48	4.6	47	4.8	79	4.8	62
14	4.5	12	4.8	11	4.6	11	4.4	10	4.6	11	4.6	10	4.6	13	4.5	12
15	4.4	7	4.4	7	4.3	7	4	6	4.7	7	4.3	7	4.4	7	4.3	6
16	4.7	22	4.3	23	4.3	21	4.7	21	4.6	21	4.3	22	4.5	24	4.2	16
17	4.8	31	4.8	33	4.7	23	4.8	26	4.9	25	4.8	25	4.9	35	4.9	30
18	4.3	39	4.4	52	4.3	23	4.3	22	4.4	27	4.3	23	4.6	69	4.4	48

Company Code	Site Admin		Timeliness		Plumbing & Waterproofing		Flooring		Structural Integrity		Electrical & Lighting		Customer Service		Transparency	
	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews
19	4.3	242	4.1	250	4.2	163	4.3	136	4.4	191	4.3	150	4.1	272	4	238
20	4.9	8	5	7	4.8	5	5	5	5	6	4.8	6	5	11	5	10
21	3.9	44	4	47	3.5	35	3.6	34	3.8	32	3.9	34	4.2	62	4.2	54
22	4.8	14	4.9	14	4.8	13	4.8	12	4.9	14	4.8	14	4.9	15	4.9	15
23	5	7	5	5	4.8	6	5	6	5	7	5	6	5	11	5	8
24	4.8	51	4.5	49	4.6	45	4.8	48	4.8	47	4.8	48	4.7	55	4.6	46
25	4.2	106	4.3	108	4.2	99	4.3	101	4.3	96	4.3	101	4.1	122	4.1	109
26	4.8	32	4.5	32	4.3	25	4.6	23	4.7	25	4.6	24	4.6	38	4.7	33
27	3.6	40	3.8	46	3.7	28	3.9	29	3.9	29	3.8	29	4.4	64	4.1	49
28	4.8	5	5	5	5	5	4.8	4	4.8	5	5	5	5	5	5	5
29	4.0	15	3.8	16	4	10	4.3	7	4.2	13	4.6	8	3.8	23	4	19
30	4.6	46	4.5	44	4.5	39	4.5	39	4.5	39	4.5	39	4.4	53	4.4	51
31	5.0	1	5	1	5	1	5	1	5	1	5	1	5	1	5	1
32	3.9	70	3.7	78	3.8	47	3.7	47	3.7	51	3.9	50	4.1	126	3.8	102
33	4.8	30	4.9	27	4.7	27	4.9	26	4.9	29	4.8	27	4.7	32	4.6	29
34	5.0	9	4.9	9	5	9	4.9	9	5	9	5	9	5	9	5	8
35	3.3	23	2.8	25	3.6	20	3.8	16	3.9	18	4.2	17	3.6	32	3.4	27
36	4.0	329	3.8	329	4.1	297	4.1	252	4.2	298	4.1	306	4.1	369	4	299

Company Code	Site Admin		Timeliness		Plumbing & Waterproofing		Flooring		Structural Integrity		Electrical & Lighting		Customer Service		Transparency	
	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews
37	4.9	18	4.9	19	4.9	17	4.9	18	4.9	17	4.8	18	5	20	4.9	19
38	4.9	10	4.6	11	4.7	6	4.8	9	4.9	8	4.9	8	5	14	5	5
39	4.6	19	4.7	19	4.4	19	4.7	17	4.8	17	4.9	18	4.8	20	4.9	15
40	4.5	22	4.6	20	4.7	17	4.7	18	4.7	19	4.7	18	4.7	23	4.6	21
41	1.0	1	4	1	2	1	1	1	3	1	2	1	1	1	2	1
42	5.0	5	5	5	5	5	4.4	5	5	5	4.6	5	5	5	5	5
43	4.6	5	4.3	6	5	2	5	1	5	2	5	3	4.8	9	5	3
44	4.0	13	3.8	12	3.8	11	4.3	11	4.2	11	4.4	11	3.8	17	3.8	17
45	5.0	2	5	2	5	2	5	2	5	2	5	2	5	2	5	2
46	3.3	36	3	40	3.4	28	3.7	23	3.4	29	3.7	27	3.8	61	3.5	42
47	4.8	16	4.4	17	4.8	16	4.8	16	4.8	15	4.7	16	4.5	20	4.5	20
48	4.3	8	4.3	11	4.4	8	4.3	8	4.3	9	4.5	8	4.4	10	5	7
49	5.0	5	4.5	4	4.8	4	5	3	5	4	5	4	4.9	7	4.9	7
50	5.0	3	5	3	5	3	5	3	5	3	5	3	5	3	5	2
51	4.0	8	3.8	8	4.3	7	4.4	7	4	7	4.6	7	4	8	3.5	6
52	4.1	13	3.7	12	4.5	11	4.3	12	4.6	11	4.3	11	4	13	3.5	6
53	5.0	1	3	1	4	1	4	1								
54	4.8	10	4.9	11	4.8	11	4.8	11	5	11	4.6	11	5	12	5	9

Company Code	Site Admin		Timeliness		Plumbing & Waterproofing		Flooring		Structural Integrity		Electrical & Lighting		Customer Service		Transparency	
	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews
55	5.0	4	5	4	5	4	5	4	4.8	4	5	4	5	5	5	4
56	3.4	41	3.4	47	3.4	32	3.6	33	3.4	34	3.6	34	3.6	61	3.5	46
57	5.0	4	4.8	4	4.5	4	5	4	4.5	4	4.8	4	5	4	4.7	3
58	4.0	16	3.7	14	4	11	4.3	9	4.6	12	4.8	11	3.9	17	4.1	15
59	2.8	6	3.8	6	3.5	6	3.4	5	4	5	3.7	6	3.6	9	3.1	7
60			5	1	5	1	5	1	5	1	5	1	5	1	5	1
61	4.2	5	3.7	6	4.3	3	5	3	5	3	4.7	3	3.8	6	3.6	5
62	4.5	6	4.8	4	5	3	5	4	5	3	5	4	5	9	4.8	6
63	4.5	2	3.5	2	5	2	5	2	5	2	5	2	5	2	4.5	2
64	4.8	13	4.8	11	4.6	9	4.9	8	4.7	9	4.6	9	4.8	14	4.7	14
65	4.7	6	4.7	6	4.8	6	5	6	5	6	5	6	5	7	4.9	7
66	5.0	10	4.3	9	5	10	4.8	9	4.8	10	4.9	10	4.5	10	4.5	11
67	3.5	8	3.4	7	3	6	3.2	5	3.4	5	3	6	4.1	20	4.5	14
68	3.8	8	4	8	4.3	7	4.4	7	4.1	7	4.1	7	4.1	9	4.2	9
69	5.0	7	5	7	5	7	5	7	5	7	5	7	5	7	5	6
70	5.0	2	5	2	5	2	5	2	5	2	5	2	5	3	5	3
71	3.7	22	3.9	23	3.8	13	4.1	12	4.2	15	4.1	14	4.1	29	3.7	21
72	4.8	12	4.8	12	5	12	5	12	5	12	5	12	5	11	5	7

Company Code	Site Admin		Timeliness		Plumbing & Waterproofing		Flooring		Structural Integrity		Electrical & Lighting		Customer Service		Transparency	
	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews
73	1.0	1	1	1												
74	3.8	8	4	8	4.2	6	4	4	4.4	7	4.3	6	3.9	7	3.9	8
75	4.8	6	5	7	5	6	5	6	5	7	5	6	5	10	5	10
76	3.1	21	2.7	18	3.5	16	3.6	17	3.5	18	3.4	16	3.2	24	3	20
77	2.7	3	3.5	2	5	1	5	1	5	1	5	1	2.6	5	2.6	5
78	3.8	5	3.3	6	4.2	6	4.4	7	4.3	7	4.4	7	4	9	2.3	3
79	4.7	7	4.9	7	4.7	7	4.7	7	4.9	7	4.6	7	4.9	10	4.9	7
80	4.2	6	4.3	6	4.5	6	4.2	6	4.3	6	4.8	6	4.5	6	4.3	6
81	4.0	8	3.9	8	3.4	7	4.2	5	4	7	4.5	6	3.8	9	4	4
82	4.0	5	4.8	4	4.8	4	4.6	5	4.8	4	4.6	5	4.4	5	4.4	5
83	5.0	4	5	3	5	3	5	3	5	4	5	3	5	4	5	4
84	5.0	3	4.8	4	4.8	4	5	4	4.8	4	5	4	5	6	5	3
85	4.5	2	4.5	2	4.5	2	4.5	2	4.5	2	4.5	2	3.7	3	5	1
86	5.0	1	5	1									4	1	5	1
87	1.7	3	2.3	3	2.3	3	2.3	3	2.7	3	2.3	3	1	3	1.5	2
88	1.0	6	1.2	6	1.3	6	1.7	6	1.6	5	2.3	6	1	6	1	5
89	1.0	1	1	1	1	1	3	1	2	1	1	1	1	1	1	1
90	1.0	4	1	4	1	1	1	1	1.5	2	1	1	1.5	8	1.7	6

Company Code	Site Admin		Timeliness		Plumbing & Waterproofing		Flooring		Structural Integrity		Electrical & Lighting		Customer Service		Transparency	
	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews	Scale	No. of reviews
91	4.8	4	4.5	4	5	4	5	4	5	4	5	4	5	5	4.8	5
92	4.8	6	4.9	7	4.6	5	5	4	4.8	5	4.8	5	5	8	4.9	7
93	5.0	6	5	6	4.8	6	4.8	5	5	6	5	5	5	6	5	6
94	4.2	6	4.3	6	4.5	6	4.2	6	4.3	6	4.8	6	4.5	6	4.3	6
95	4.0	8	3.9	8	3.4	7	4.2	5	4	7	4.5	6	3.8	9	4	4
96	4.0	5	4.8	4	4.8	4	4.6	5	4.8	4	4.6	5	4.4	5	4.4	5
97	5.0	4	5	3	5	3	5	3	5	4	5	3	5	4	5	4
98	5.0	3	4.8	4	4.8	4	5	4	4.8	4	5	4	5	6	5	3
99	4.5	2	4.5	2	4.5	2	4.5	2	4.5	2	4.5	2	3.7	3	5	1
100	5.0	1	5	1									4	1	5	1
101	1.7	3	2.3	3	2.3	3	2.3	3	2.7	3	2.3	3	1	3	1.5	2
102	1.0	6	1.2	6	1.3	6	1.7	6	1.6	5	2.3	6	1	6	1	5
103	1.0	1	1	1	1	1	3	1	2	1	1	1	1	1	1	1
104	1.0	4	1	4	1	1	1	1	1.5	2	1	1	1.5	8	1.7	6
105	4.8	4	4.5	4	5	4	5	4	5	4	5	4	5	5	4.8	5
106	4.8	6	4.9	7	4.6	5	5	4	5	4.8	4.8	5	5	8	4.9	7
107	5.0	6	5	6	4.8	6	4.8	5	5	6	5	5	5	6	5	6

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