

# ***Improving Customer Satisfaction in the Home-Buying Process by Applying DMAIC***

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**Abstract** — *Customer satisfaction is an important aspect for the success of any business that provides services. This research strives to provide new methods or ways to improve customer satisfaction during the process of buying a home. The new methods were developed using the Six Sigma improvement cycle DMAIC (Design, Measure, Analyze, Improve and Control). To analyze this topic, customer complaints regarding the service provided by lenders and builders during the purchase of a home were evaluated. Complaints were classified in different categories and the root cause was identified. As a result, it was possible the development of solutions to improve the different aspects of the service where customer's expectations were not achieved. The proposed solutions can be implemented by the service providers to improve customer satisfaction during the home-buying process.*

**Key Terms** — *Customer Satisfaction, DMAIC, Improvements, Six Sigma.*

## **INTRODUCTION**

This research work aims to design or find new methods to improve the quality of customer service during the process of buying a house, especially when it is a new construction in the United States. The housing market is vital for the U.S. economy; therefore, it is something that needs to be stimulated and taken care of in order to keep it flowing and growing. Unfortunately, with the constant growth and development of different areas in the country, sometimes the good customer service practices are lost in this process.

Experiencing this dilemma when buying a new-construction house in an area that is in development and it is growing at a fast pace, can be overwhelming

for homebuyers. From personal experience, it can be said that the whole process turns into something strenuous, draining and frustrating from the beginning of the search for the “perfect” house, to the closing, and move-in. The service received from the sales representative in different communities was average, the communication and interactions with the lender were very informal and confusing, and the quality of the house construction has been very disappointing. After investigating in-depth about this issue, is something that is continuously happening and not just in an area but in different areas of the country.

Buying a house is exciting and yes, it is stressful for many reasons but should not be a nightmare and much less because of bad customer service; on the contrary, a customer should be appreciated. Excellent customer service during this process is the key to make it go smoothly. For this reason, there are many people that prefer to lease instead of buying; some withdraw in the middle of the process, and others regret buying after they move-in. All this negativity can be reduced by finding new ways to improve this process.

## **RESEARCH BACKGROUND**

There is a lot of competitiveness in the US housing market, for both lenders and builders, especially in areas being developed or those that are in constant growth. Therefore, these companies need to strive to provide excellent customer service and to stand out over their competitors to stay in the market. Unfortunately, in areas where there is a high demand for the development of new communities, these companies tend to neglect or disregard the good quality practices and customer service. As a result, this leaves unsatisfied customers and a lot of bad reviews. Over the years, there have been a couple of

researchers that have studied the process of buying a house in different markets in order to understand customer's dissatisfaction, and have tried to answer questions like why this process is so confusing and why the builders are failing to fulfill the buyer's expectations?

### **The Complexity of the Home-Buying Process**

A survey conducted by LandAmerica Financial Group in the United States showed that the 86% of homebuyers confronted difficulty and confusion during the process of buying a house and more than a third part of the survey participants experienced delays on the process of closing the purchase. After a member of the HUD confronted these issues while in the process of buying a house, a proposal for the reforming of the regulatory requirements under the Real Estate Settlement Protection Act of 1974 (RESPA) was made. Even though the main purpose of this initiative was to ease the home buying process and making it less confusing, the amendments made to RESPA turned out to be beneficial to low-income and minority homebuyers making homeownership more accessible instead. Again, the responsibility of the ease of the process remains on the realtor, lender and title agent. It should be noted that besides the complexity of this process, it's still the envy of the world for its efficiency, security and low cost for homebuyers, but this doesn't mean that the home buying process can't be improved [1].

### **Demands Affects Building Quality**

Jauregui [2] expressed his concerns about the need for quality documents in the process of home construction. Through the article, he exposed that the housing demands was affecting the planning of the construction, that architects lost the sense of the importance of developing a good set of drawing for residential construction. Because of this, the burden of the design development and specifications moved from the architect to the builder. Builders enjoyed having this control but due to the lack of expertise, the results were unsatisfactory for all affecting on the most part, the homeowner.

If there aren't good blueprints establishing tolerance materials and specifications for the construction, builders could cut the corners resulting on catastrophic events or early deterioration of the newly constructed properties. It is crucial to maintaining the quality of a home during the construction phase, since after completion it is very expensive to upgrade the materials to achieve better quality. The quality of a property is layered and without quality on the base it will be very difficult to achieve quality on the top layers. Purchasing a home, it's a giant step and in most instances, a huge effort for that reason, builders should provide quality products to their customers; otherwise the market will crash due to a lack of faith of the population on the new constructions.

### **Understanding Customer Satisfaction in Residential Construction**

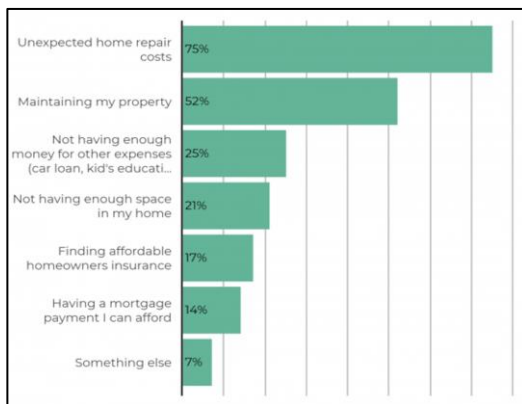
Due to the level of competitiveness in the housing market, it is important for lenders and builders to find methods to achieve customer satisfaction and stand out from their competitors. This is something that can be seen in various countries, not just in the United States housing market. Different studies in this matter have been performed in countries like Australia, Mexico, and India. The purpose has been to understand the customer needs and satisfaction regarding residential construction specifically. Each of these three studies performed a different technique in order to evaluate customer satisfaction. For the study in Australia, a conceptual framework was developed by using marketing theory merged with construction concepts. The framework aims to act as a stepping stone for determining how empirical data from real residential construction situations and real customers, fit marketing theory [3]. In other words, it evaluates customer's pre-purchase expectations and perceptions during and after the completion of construction.

The study performed in Mexico aimed to determine the level of customer satisfaction in a specifically sector in the city of Toluca. The technique used in this case was a Likert scale

questionnaire. After the questionnaire was given to users from 78 houses within eight different projects, some issues were identified that builders could improve, and consider during the design stage of new housing developments [4]. Among the main aspects found, that can be improved by the building companies, were the insulation, wall and ceiling materials, space distribution, and house size.

### Homeowners and Renters' Facts

In a report published by NerdWallet [5] people said that being a homeowner causes anxiety. Two-thirds (65%) of homeowners have experienced anxiety related to their home, and 75% of those said that unexpected home repair costs were the cause. Also, NerdWallet conducted an online survey in 2018 where they asked 974 homeowners which of 7 statements about homeownership caused them more anxiety. Their response can be seen in Figure 1.



**Figure 1**  
Which of the Following have given You Anxiety about Homeownership?

The statements below are general statistics about United States housing market published by iProperty Management:

- “The housing industry represents more than a quarter of our nation’s total investment dollars and about 5% of our total economy.
- There are currently over 136.57 million housing units in the U.S.
- 930,000 of housing units in the U.S. are rentals.
- In 2018, the total number of homeowner households hit an all-time high of 76.2 million.
- 36.6% of households rent their homes.

- The rental vacancy rate is 7.2%; the homeowner vacancy rate is 1.6%. The national rental vacancy rate rose in 2018 for the first time since 2009, ticking up from 6.9% to 7.2%.
- According to the 2018 census, the homeownership rate is 64.4% [6].”

The information presented above allows the reader to evaluate and understand U.S. housing market. iProperty Management published some interesting facts that summarize the behavior of the housing market for the past decade. The facts seen above were collected from multiple sources such as Harvard University Studies, U.S. Census Bureau, and others. These facts were used to support the basis of the research performed.

### METHODOLOGY

The research will be focused on the service provided by the lender and builder. The aspects to be analyzed regarding the lender are interaction and communication. On the other hand, the aspects to be analyzed regarding the builder will be housing delivery and quality of construction.

An additional objective is to identify the common flaws in the process that create a stressful environment for the customer. If we can identify areas of improvement that will increment customer satisfaction and improve the quality of the product without creating a financial burden, the parties involved in the process could become interested in the ideas.

### Research Design

The design used to develop this project is qualitative research. Qualitative research method allows the collection of data based on the observation of behaviors, discussions, and open responses for interpretation as an object of study [7]. This research will be focused on the feedback collected about the financial institutions and builders by the Better Business Bureau and Consumers Affairs. The data will be sorted and evaluated to identify common issues across the board. To achieve the objectives established for this research, the

quality strategy DMAIC (Design, Measure, Analyze, Improve, Control) which is an integral part of Six Sigma, will be applied.

### **Six Sigma and DMAIC**

The Six Sigma methodology is a philosophy that began in the '80s as a market and quality improvement strategy in the Motorola company, when the engineer Mikel Harry started to promote the study of the processes' variation as a way to improve them. These variations are what in statistics is known as the standard deviation. From the Six Sigma initiative aroused an effort focused on improving quality by setting as an objective to reach a level of 6's Sigma. Later, Lawrence Bossidy, Allied Signal CEO, after knowing about this new methodology, he acquired it and implemented it in his corporation achieving with it significant increases in its profitability. Two years after Six Sigma was implemented in Motorola, the company received the Malcolm Baldrige National Quality Award (MBNQA). Six Sigma went from an improvement methodology in manufacturing to a philosophy present in all areas and levels of an organization. Later, this philosophy was implemented in different types of organizations and sizes resulting in cost savings, sales growth, profit increase, reduced design time, increase productivity, customer's loyalty and improvement of logistic processes and in general any process in which it was implemented.

Six Sigma consists of a model of quality management that is also known as DMAIC, the acronym of design, measure, analyze, improve and control. The DMAIC takes a problem that has been identified by the organization and applies a set of tools and techniques in a logical style to reach a sustainable solution. These are the five phases to be applied in the process:

- **Define:** to define the process or processes which will be the subject to be evaluated. In this phase, it's also established the team that will be doing the project and improvement objectives are defined.

- **Measure:** it is important to understand the current state of the problem or defect through which the process under improvement goes through. Each part of the process is classified and evaluated identifying the variables related to it and proceeding to measure them.
- **Analyze:** the results of the measurement are analyzed and interpreted, contrasting the current situation with the history of the process. In this phase is where the cause of the problem can be identified.
- **Improve:** the actions considered necessary to improve the process are carried out.
- **Control:** necessary measures are applied to guarantee the effectiveness and continuity of the process, which will be appropriate for the new objectives [8].

### **RESULTS AND DISCUSSION**

The DMAIC model implementation on the selected process for quality improvements will be discussed. The discussion will be divided into the five steps of the DMAIC model describing the data collection, analysis, results, and findings.

#### **Define Phase**

The research performed pretends to analyze the customer service provided by lenders and builders during the house-buying process, particularly in the US housing market. The process of buying a home is tedious by nature due to all the paperwork and decisions that it involves but receiving good customer service during this process can make it easier. Another aspect of this process that tends to affect customer satisfaction is the quality of construction when buying a newly built house. To perform this analysis, a sample of the customer's feedback from two lenders and two builder's companies was collected. The four companies selected provide services in the whole country of the United States. All customer's feedback was obtained through the platforms ConsumerAffairs reviews; they were made between 2017 and 2019 [9, 10, 11].

The purpose of analyzing customer feedback was to understand if the customer service given by these companies is affecting the customer's decision making of whether buying a house or not. Also, to find if there is an opportunity for improving the customer service given, to achieve customer satisfaction.

**Measure Phase**

The data collection for this research was performed through an extensive search of customer feedback regarding the service provided by two building companies Lennar and Ryan Homes, and two lenders Eagle Home Mortgage and Homebridge Financial. These four companies were randomly selected, and they provide services in the whole United States to have a broad perspective of the customer service level in different areas of the country. A total of 200 reviews were collected divided into 50 reviews from each company mentioned before between the years 2017 and 2019. Through the data gathered, it was possible to identify the common complaints or missing opportunities. The reviews were classified by the number of stars given by the customer:

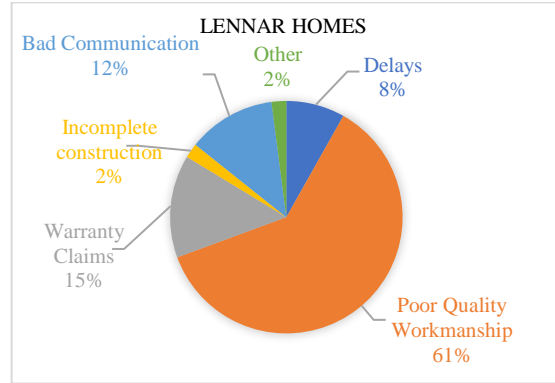
- 1-2 stars reviews were considered Negative.
- 3 stars reviews were considered Neutral.
- 4-5 reviews were considered Positive.

Lennar Homes received 48 negative reviews and two positive reviews. Ryan Homes received 44 negative reviews and six positive reviews. Eagle Home Mortgage received 38 negative reviews and 12 positive reviews. These three companies had either positive reviews or negative reviews but no neutral opinions. On the other hand, Homebridge Financial had 11 negative reviews, two neutral reviews and 37 positive reviews showing more consistency in the customer's opinions.

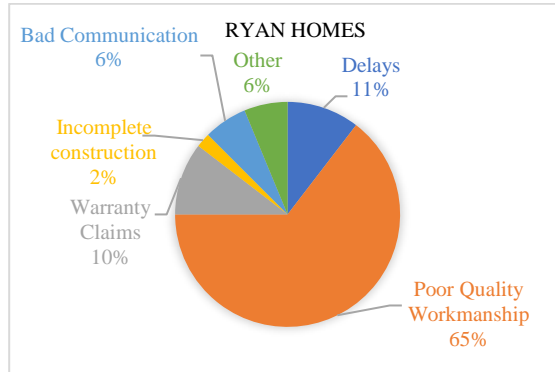
**Analyze Phase**

To have a better understanding of customer's needs and identify where the service provider was falling to achieve customer satisfaction and prove the hypothesis, complaints categories were established. In Figures 2 and 3 are the complaints

analysis for builders presented in percentages. In both building companies the category with the highest percentage was the poor quality of workmanship.

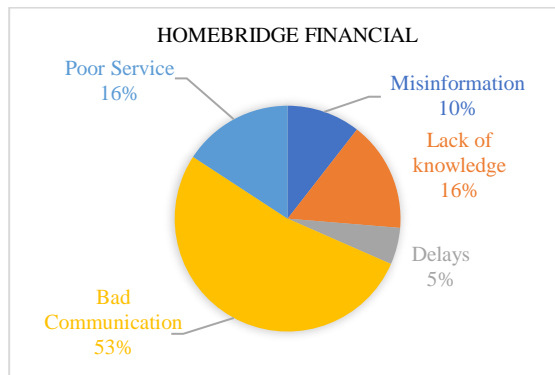


**Figure 2**  
Lennar Homes Complaints Categories Percentages



**Figure 3**  
Ryan Homes Complaints Categories Percentages

The same analysis process was followed to classify and analyze the complaints from the lending companies. In Figures 4 and 5 are the complaints analysis for lenders presented in percentages.



**Figure 4**  
Homebridge Financial Complaints Categories Percentages

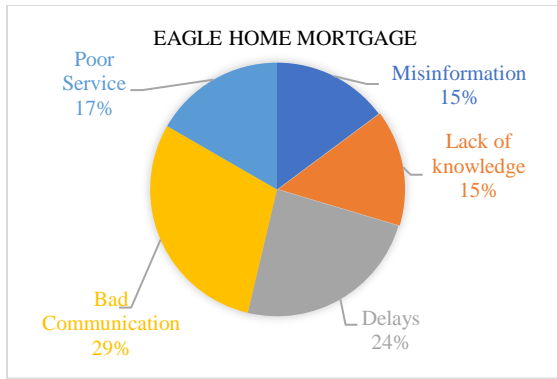


Figure 5

**Homebridge Financial Complaints Categories Percentages**

Next, all issues presented in the complaints from the builders and lenders were analyzed using the root cause analysis technique, cause and effect or fishbone diagram seen in Figures 6 and 7.

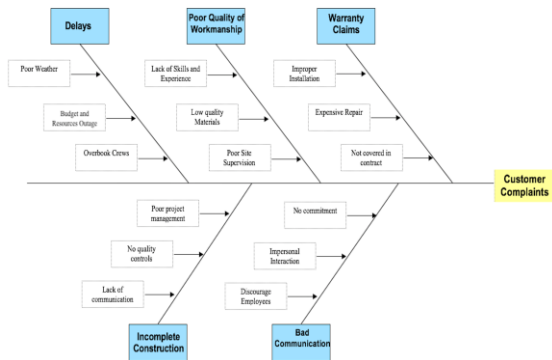


Figure 6

**Builders' Complaints Fishbone Diagram**

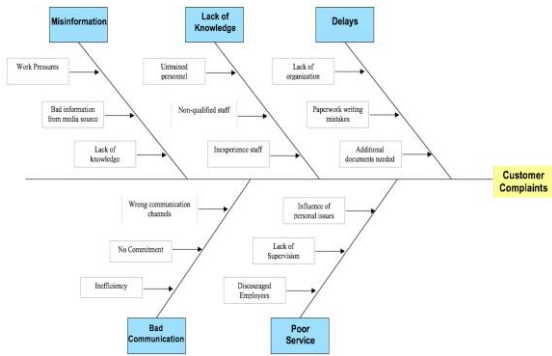


Figure 7

**Lenders' Complaints Fishbone Diagram**

**Improve Phase**

In this phase, some methods to eliminate the root cause of customers' complaints were developed. The service providers can apply those methods to improve customer satisfaction. Tables 1 and 2 show

the practice of new methods that can decrease customers' complaints about builders and lenders.

**Table 1  
Builders' Improvements Suggested**

Complaint	Method
Delays	<ul style="list-style-type: none"> <li>• Provide project management training.</li> <li>• Schedule contractors far in advance.</li> </ul>
Poor Quality of Workmanship	<ul style="list-style-type: none"> <li>• Use of specifications.</li> <li>• Review building code and industry standards.</li> <li>• Provide on-site quality supervision</li> <li>• Develop quality inspection forms.</li> </ul>
Warranty Claims	<ul style="list-style-type: none"> <li>• Develop a system for warranty claims processing and tracking.</li> <li>• Analyze warranty data to identify and manage common issues.</li> </ul>
Incomplete construction	<ul style="list-style-type: none"> <li>• Provide project management training.</li> <li>• Establish quality control procedures.</li> </ul>
Bad Communication	<ul style="list-style-type: none"> <li>• Improve employee engagement.</li> <li>• Provide customer service training to staff to strengthen their skills.</li> <li>• Keep track of customers' feedback.</li> </ul>

**Table 2  
Lenders' Improvements Suggested**

Complaint	Method
Misinformation	<ul style="list-style-type: none"> <li>• Keep track of what is being published by the media.</li> <li>• Provide customers accurate information.</li> </ul>
Lack of knowledge	<ul style="list-style-type: none"> <li>• Provide consistent training about changes in the industry and processes.</li> </ul>

	<ul style="list-style-type: none"> <li>• Hire experienced and qualified personnel.</li> </ul>
Delays	<ul style="list-style-type: none"> <li>• Develop a checklist to track all paperwork.</li> <li>• Provide training in time management.</li> </ul>
Bad Communication	<ul style="list-style-type: none"> <li>• Follow-up after a problem is solved.</li> <li>• Evaluate the current communication channel efficiency.</li> <li>• Provide customers an orientation of the process steps and keep them informed of any change or delay.</li> </ul>
Poor Service	<ul style="list-style-type: none"> <li>• Provide employee recognition to promote engagement.</li> <li>• Provide employees a channel to communicate how they feel regarding work conditions, compensations, and opportunities.</li> <li>• Enhance customer service strategy.</li> <li>• Develop a space for customers to provide their feedback.</li> </ul>

### Control Phase

In today's world, there is an urgent need to continually improve processes due to the consistent growth of the markets' demands and beside these techniques and theories of experts have evolved to achieve business success. For that reason, it is necessary not only to have skilled, motivated workers that are willing to change but also executives that can lead the change with a vision of the future and dispositions towards improvements.

Through this research, it was determined that these companies need to apply a continuous improvement philosophy. Continuous improvement rather than approach is a strategy that consists of a series of actions and the implementation of resources

to achieve complete objectives in all processes in which it is applied. Nowadays, there are multiple models of continuous improvement in business, most of them are associated with the increase of quality of products or services, but in general, their steps or stages can be applied to any function or business process to be improved.

Business success it's achieved when customers' needs, and expectations are satisfied, and quality equals the grade in which those needs are covered. Therefore, it is so important to know customer's feedback towards a product or service been offered. To maintain the quality of service Lennar Homes, Ryan Homes, Eagle Home Mortgage and Homebridge Financial need to monitor their customers' needs and expectations. These results can be achieved by creating a channel of communication with their customers and be open to hearing their complaints and suggestions. In other words, they need to develop a practice for measuring service quality.

Some of the methods that can be executed to measure the quality of the service are:

- Satisfaction Surveys
- Customer Satisfaction Metrics
  - Net Promoter Score (NPS): measures customer satisfaction through a simple question like 'Would you recommend us with your family and friends?'. The answer is presented on a scale from 1 to 10 with which customers can be classified into three types of clients, "promoters," "passives," and "detractors." In that way, businesses can identify how their customers feel about the business.
  - Customer Satisfaction Score (CSAT): is one of the most common methods and its function consists of the application of surveys that aim to measure satisfaction with specific experiences. Normally the answers consist of a 5-point scale from "Very Satisfied" to "Very Unsatisfied." It gives a score that reveals the general status regarding a particular service, interaction, procedure or product. Since it provides

precise information, companies can meet or improve certain aspects of their business.

- Customer Effort Score (CES): it combines NPS and CSAT. It is a metric that quantifies the effort made by a customer to have their requests or questions answered. The CES focuses on the process that people must go through to get help and can include questions that indicate the level of difficulty involved in solving their issues. Customers need to select one of seven answers from a scale beginning with “Strongly Disagree” through “Neutral” and ending with “Strongly Agree” [12].

## CONCLUSION

The presented research was performed to point out the level of satisfaction that customers have regarding the services received during a home-buying process. Precisely, the service provided by builders and lenders. To develop this research, specific companies were selected as a sample of the market. The investigation performed consisted of the recollection of customers’ feedback from two building companies: Lennar Homes and Ryan Homes and two lenders Eagle Home Mortgage and Homebridge Financial. The selection of these companies was performed through a random selection from companies that provide services in the whole country of the United States. Later, the collected data was classified and presented in charts for better understanding.

The application of DMAIC methodology permitted the identification of flaws in the services provided by the companies mentioned before during the home buying process. Besides, it allowed the development of methods to eliminate the root cause of those issues. With this integration, it was also possible to fulfill the objectives of the project that were to provide possible solutions to improve the different aspects of the service were customer’s expectations were not been met. Companies can achieve better results by the continuous improvement and application of the control phase

and by taking the appropriate corrective and preventive actions.

Through this research work, it was determined that there is an existent need for housing developers in the U.S. to improve the quality of their products and services. As well, it is necessary that the agencies responsible for the authorization, examination, and delivery of housing developments to comply with their tasks of following up with the construction and the final inspections of those properties for quality assurance. After the application of the DMAIC methodology, a series of different methods were identified and suggested that the companies Lennar, Ryan Homes, Eagle Home Mortgage and Homebridge Financial can employ to improve their relationship with their customers.

For further research, it would be recommended to incorporate public involvement in the study. Thus, a realistic evaluation of the issues presented in the current research, the participation of customers that are currently in the process of acquiring a new home would be beneficial and determinant. Through that interaction, it can be obtained additional information to reinforce the findings. Also, it will be convenient to carry out experimental studies on the implementation of the methods for customer satisfaction improvement to determine if the expected outcomes are obtained.

## REFERENCES

- [1] L. Tiedke, “Home buying process doesn't have to be so confusing”. *Fort Worth Business Press*, vol. 16, no. 13, p. 28, March 28, 2003.
- [2] L. Jauregui, “The need for quality documents,” *Residential Design & Build*, vol. 72, no. 7, p. 10, Sept 2007. Available: <http://ezproxy.pupr.edu:2058/login.aspx?direct=true&db=bth&AN=26324295&site=ehost-live>. [Accessed: January, 2019].
- [3] P. Forsythe, “Monitoring Customer Perceived Service Quality and Satisfaction during the Construction Process,” *Construction Economics and Building*, vol. 15, no. 1, pp. 19-42, 2015. Available: <https://search.informit.com.au/documentSummary;dn=297665846265476;res=IELBUS>. [Accessed: January, 2019].
- [4] J. D. Delgado-Hernández & L. Romero-Ancira, “Customer Need's Satisfaction in the Housing Sector: The Case of the



- Toluca Valley,” in *Engineering, Research & Technology*, vol. 14, no. 4, Dec. 2013. Available: [http://www.scielo.org.mx/scielo.php?script=sci\\_arttext&pid=S1405-77432013000400004](http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1405-77432013000400004) [Accessed: January, 2019].
- [5] E. Renter. (2018). “Picture Improves for Homeowners”, in *NerdWallet* [Online]. Available: <https://www.nerdwallet.com/blog/mortgages/2018-homeownership-pulse/>. [Accessed: April, 2019]
- [6] CA Property Management Los Angeles, “Homeowners vs Renters Statistics & Demographics by State”, *iProperty Management*, 2019. [Online]. Available: <https://ipropertymanagement.com/renters-vs-homeowners-statistics/>. [Accessed: April, 2019].
- [7] C. Flipp. (2014). *Qualitative vs. Quantitative* [Video file]. Available: <https://www.youtube.com/watch?v=2X-QSU6-hPU>. [Accessed: February, 2019].
- [8] R. Shankar, *Process Improvement Using Six Sigma A DMAIC Guide*. Milwaukee, WI: ASQ Quality Press, 2009.
- [9] Consumer Affairs. (2019). *Lennar Homes Reviews* [Online]. Available: <https://www.consumeraffairs.com/homeowners/lennar-homes.html>. [Accessed: March, 2019].
- [10] Consumer Affairs. (2019). *Ryan Homes Reviews* [Online]. Available: <https://www.consumeraffairs.com/housing/ryan.html>. [Accessed: March, 2019].
- [11] Consumer Affairs. (2019). *Homebridge Financial Reviews* [Online]. Available: <https://www.consumeraffairs.com/finance/homebridge.html>. [Accessed: March 2019].
- [12] B. E. Hayes, *Measuring Customer Satisfaction and Loyalty: Survey Design, Use, and Statistical Analysis Methods*, 3<sup>th</sup> ed., Milwaukee, WI: ASQ Quality Press, 2008.