2015

Relationship between product quality and customer satisfaction

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This is to certify that the doctoral dissertation by

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has been found to be complete and satisfactory in all respects,
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2015

Abstract

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in the U.S. Automobile Industry

by

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MBA, John F. Kennedy University, California, 1985

MPA, John F. Kennedy University, California, 1984

BSCE, Mapua Institute of Technology University, Philippines, 1968

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Applied Management and Decision Science

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Abstract

The National Safety Council (NSC) estimated that over 35,000 people died in U.S. traffic accidents. About 3.8 million traffic crash injuries requiring medical attention occurred in 2013, and the number of deaths was about the same over the last 5 years. The NSC found that product recalls, car repairs, injuries, and deaths were due to unsafe product designs or inferior product quality. These statistics underscore the challenge of producing quality vehicles while satisfying customers. The purpose of this nonexperimental study was to examine relationships among product (vehicle) quality, product cost, product safety, and consumer satisfaction. The hypotheses inquired the extent to which relationships exist between product quality and customer satisfaction and if product cost and product safety influence this relationship. The theoretical foundation included theories on product quality and consumer satisfaction associated with the cost and safety theories such as product quality and customer satisfaction that are critical factors that can promote positive social change. Data were collected from a random sample ($N = 77$) of U.S. automobile users and analyzed via simple and multiple linear regression, which showed a significant statistical relationship between product quality and customer satisfaction. However, neither the product safety nor product cost helped mediate the relationship between product quality and customer satisfaction. Building high-quality cars leads to fewer injuries and deaths associated with vehicular accidents, thus promoting positive social change for both U.S. automobile buyers and sellers.

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Dedication

I dedicate my dissertation research study, in which I investigated the relationship between product quality and customer satisfaction to the unquenchable memory of my deceased loving wife and best friend, Linaflor Manantan Cruz, who passed away on October 29, 2012 as I began the dissertation procedure. My loving wife wished that I completed my study even after her passing away. I also dedicate this work to the memory of my late parent Juan Perez Cruz and Leonora Vitales Cruz, whose supports and encouragements to my study made this achievement possible.

Acknowledgments

This research would not have been successfully completed without the able directions of the following faculty members of the Walden University. Chairperson Dr. David Gould, who spent numerous hours in reviewing my dissertation at a high level of expectation; Dr. Mohammad Sharifzadeh, whose knowledge of research methods and statistical analyses was commendable; Dr. Christos Makrigeorgis, who helped diligently with the assessment and approval for the *University Research Review*; Dr. James Stewart, who mentored me during the preparation of my first three Knowledge Area Modules (KAMs); and Dr. Irmak Randa-Tanali, who journeyed with me throughout the review of my last two KAMs. I also acknowledge my siblings Ernesto V. Cruz, Josefina C. Calayag, Gerardo V. Cruz, Erminda C. Mora, Corazon C. Millena, and Salvador V. Cruz for their morale and physical supports during my studies and while I was grieving over the loss of my dear wife, Linaflor Manantan Cruz.

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Chapter 1: Introduction to the Study

A well-developed transportation system plays a key role in the development of an economy. With the growth of the transportation system, the automotive industry is also growing, occupying a place in the economy. Consumer perception has an equivalent role to play in the growth and development of the automobile industry (Pednekar, 2013). Negative customer satisfaction and decreased customer loyalty continue to emerge because consumers compare product quality, product cost, and product safety features associated with competitive product offerings. Because of these issues, Setó-Pamies (2012) noted that there is the need for more research on automotive quality.

In this quantitative study, I examined the relationship between product (car) quality and customer satisfaction using product cost and product safety as mediators. The U.S. automobile industry was the focus of this study because of the loss of customer satisfaction attributable to product quality, product cost, and product safety of U.S. automobiles. In this study, I helped to identify possible parameters and a framework for development, which influences the consumer behavior patterns on the purchase of passenger car. The data obtained on the level of customer satisfaction may capture top management's attention for quality, cost, and safety programs that can improve manufacturing practice. Management emphasis on these essential programs has been insufficient given the many-recorded lapses in customer satisfaction. The objectives of an enterprise and the plans required to meet these objectives have direct bearing upon the characteristics and structure of the plant and its organization.

There is an indication that a relationship may exist among product quality, product cost, and product safety. Dillard and Bates (2010) noted that challenges in managing automobile design and production continued to exist in the environment because customers of U.S. automobiles compare product quality, product cost, and product safety features of competitive offerings before end user purchases were completed. Consequently, Dillard and Bates suggested that high costs are found to be associated with product recalls, car repairs, injuries, and deaths because of unsafe product designs or product quality. The role of effective engineering management in improving product quality, lowering the cost of production, ensuring safety, and promoting greater customer satisfaction is fundamental to achieving a positive social change.

The following sections of this chapter include the problem statement, the research questions, the null hypotheses and alternative hypotheses for the dependent and independent variables, followed by a discussion of the theoretical framework for the study. I then identify and provide a definition of the dependent, independent, and mediator variables, followed by a research concept map, which shows the dynamic relationship between these variables and how they interact to influence customer satisfaction. The chapter then includes the significance of the study and the professions and individuals that may benefit from the study. I then provide a discussion of the assumptions, limitations, and delimitations of the study and the effectiveness of deriving logical inferences in the research study, followed by a summary of the dissertation.

Background

Product quality and product cost, as dominant factors of customer satisfaction and loyalty, are important aspects in management theory and practice in the U.S. automobile industry (Bresnahan, 2010; Eckert & Hughes, 2010; Zinn & Haddad, 2007). In this research study, the automobile industry included U.S. brand and domestically assembled foreign vehicles. Product quality and product cost mean different things to different consumers (Bresnahan, 2010; Woo, Magnusen, & Kyoum, 2014). The concepts of product quality and product cost encompass a variety of drivers and implications for business performances, which are not yet fully understood. Dynamic challenges in managing automobile design, production costs, and product safety continue to emerge (Knudsen, 2010; Wolf, 1986) because consumers compare product quality, cost, and safety features of competitive offerings before acquisitions were completed (Chun, 2009; Rosenfeld, 2009; Scheere, 2010).

High costs are found to be associated with product recalls, car repairs, injuries, and deaths because of unsafe product designs or product quality (Chaudha, Jain, Singh, & Mishra, 2011; Gosnik & Jujica-Herzog, 2010; Harper, 1993; Harper & Porter, 2011; Jujica-Herzog, 2010; Lofgren & Witell, 2008). Brucks, Zeithaml, and Naylor (2000) as well as Burgess (1996) noted that product quality, product cost, product safety, and customer satisfaction in the U.S. automobile market has been recognized as an important subject or research problem in both management theory and practices. However, these factors still mean different things to different researchers and consumers (Natarajan, Soundararajan, & Jayakrishnan, 2013; Setó-Pamies, 2012). Nonetheless, there is little to

no academic research analyzing the relationship between these predictors and customer satisfaction in the manufacturing environment (Klaus & Maklan, 2013; Tsai & Hsu, 2010).

There was a need for research on consumerism to help inform the management of organizations to make informed decisions that will affect customer satisfaction positively (Woo, Magnusen, & Kyoum, 2014). It is difficult to learn how to improve the quality of goods and services to consumers while boosting productivity, competitive edge, and market position in the global markets. Job experience without product cost mitigation measures and enhanced safety influences on product effectiveness cannot solely increase customer satisfaction and customer loyalty that seek to increase market share on revenue acquisitions (Hill, Zhang, & Gilbreath, 2011). The relationship among quality product, product cost, product safety, and customer satisfaction that enhanced market share is a well-explored subject in manufacturing industry; yet, customer satisfaction and loyalty that is supposed to enhance revenue acquisitions continues to falter (Knudsen, 2010; Wolf, 1986). This was attributed to profit maximization objectives by businesses (Deming, 1982, 1986; Juran & Gryna, 1970). Foundation of these contemporary findings has long been established and argued (Brucks, Zeithaml, & Naylor, 2000; Deming, 1982; Drucker, 1986; Juran, 1992).

The concept of quality is difficult to study, because people perceive quality differently (Brucks et al. 2000; Burgess, 1996). Some scholars have focused on combined or assimilated design of products and services (Zaifang & Xuening, 2010). Zaifang and Xuening noted that due to the absence of a focus on integrated design of products and

services, top management seek help from professional managers and academic researchers. Academic researchers are experts from the outside because it is difficult to learn how to improve quality products, productivity, and competitive position via job experience alone (Xu, Leung, & Yan, 2013).

Best efforts within the confines of organizations alone will not lead to the proper learning that is necessary to increase business position. Golder, Mitra, and Moorman (2012) argued that top management practitioners of production lines reacted when a loss of competitiveness and market share were identified as efforts are made through various ideas to find solutions (Bresnahan, 2010; Brucks et al. 2000; Burgess, 1996). This reactionary approach wastes energy, increases product costs, and frequently fails to yield any resolutions (Harper & Porter, 2011). Consequently, middle management and line workers become confused with ever changing directives from the upper management (Chen, 2008; Li & Chen, 2009).

Problem Statement

Traffic accidents have increased recently. The National Safety Council (NSC, 2015) estimated that 35,200 people died in U.S. traffic accidents and about 3.8 million traffic crash injuries requiring medical attention occurred during 2013. The auto-related fatalities, injuries, and property damage during 2013 came with a high price tag of $267.5 billion, which included medical expenses, employer costs, lost wages, property damages, and related expenses (NSC, 2015). The NSC-estimated costs excluded the manufacturers' expenses resulting from car recalls. At the end of 2014, U.S. automakers issued over 550 recalls affecting more than 52 million vehicles, which shattered the old full-year record of

30.8 million recalled vehicles set in 2004 (author, year). Ford alone recalled more than 202,000 cars, vans, and trucks in North America in five separate recalls to fix gas leaks, air bag sensors, steering shafts, and other issues (author, year). The problem is that producing quality product and satisfying customers in the United States remains unresolved.

Purpose of the Study

The purpose of this quantitative survey study was to examine the relationship between product quality and customer satisfaction using product cost and product safety as mediators. The primary objective included examining and evaluating the variables in this study to determine the relationship between product quality and customer satisfaction in the U.S automobile industry marketplace. The secondary objective was to understand the consumer needs in purchasing U.S. automobiles.

In this study, I used a quantitative, cross-sectional survey research design with multiple regression and mediation statistical techniques to determine the relationship between the predictors and the dependent variable. Results from this study may inform researchers, the automobile manufacturing professional managers, and other stakeholders of how automobile quality, product cost, and product safety factors used to meet and enhance customer satisfaction in capital markets using the U.S. automobile market as the proxy. Customer satisfaction may include product quality, product safety, and product cost in purchasing U.S. automobiles.

Research Question and Hypotheses

In the United States, customer satisfaction is the key to running a successful business (Krivobokova, 2009; Setó-Pamies, 2012). The U.S. automobile industry faced a challenge in eliciting appreciable customer satisfaction responses. This trend puts the industry in difficult and unsatisfactory situation, which could translate into low production levels or performing below its capacity. There was the need for more research on consumer satisfaction and product quality (Setó-Pamies, 2012). I sought to fill the gap in literature regarding the relationship between product quality and customer satisfaction. The results of the study reported in Chapter 4 will inform product management and production engineers, as well as policy makers in the automobile industry, about the importance of efforts to improve customer satisfaction through product safety fulfillments in the U.S. auto market.

The central research question guiding this study was as follows:

1. Do consumer satisfaction theory, product quality theory, product cost theory, and product safety theory explain the relationship between consumer satisfaction (dependent variable) and product quality (independent variable) through the mediator variables, product cost, and product safety?

Hypotheses

This research question leads to the following hypotheses:

Hypothesis 1

H_0: Product quality is not a significant predictor of consumer satisfaction.

H_1: Product quality is a significant predictor of consumer satisfaction.

Hypothesis 2

H_0: Product cost is not a significant mediator for the relationship between product quality and customer satisfaction.

H_1: Product cost is a significant mediator for the relationship between product quality and customer satisfaction.

Hypothesis 3

H_0: Product safety is not a significant mediator for the relationship between product quality and customer satisfaction.

H_1: Product safety is a significant mediator for the relationship between product quality and customer satisfaction.

Theoretical Foundation

There was a need for design engineers to use skill sets based on the application of enhanced technical knowledge that encapsulates product quality, cost control, and safety to meet customer expectations and satisfaction (Harper & Porter, 2011). In the theoretical foundation in this study, I captured the theories on product quality and consumer satisfaction associated with the cost and safety theories. These theories include the importance of providing consumers with confidence in using manufactured products.

The debate in high quality automobile design, product cost, product safety, and product management are well-documented and researched (Eckert & Hughes, 2010; Power, Schoenherr, & Samson, 2011). These paradigms continued to shape and inspire discussions among practitioners and academic researchers as a consequence of product

quality and high product costs associated with product safety features that have influenced competitive offerings and product comparisons by automobile customers in the U.S. automobile market (Natarajan, Soundararajan, & Jayakrishnan, 2013; Setó-Pamies, 2012). High product costs in the U.S. automobile market have been found to be associated with product recalls, car repairs, user end injuries, and deaths due to unsafe product designs or inferior product quality.

The theoretical foundation of this study included product quality and customer satisfaction (Anderson, Fomell, & Lehmann, 1994; Juran & De Feo, 2010; McLaughlin, 2010; Saleh, 2008; Tsai, 2010). In this study, I examined factors associated with customer satisfaction and higher lifetime value theory of consumer satisfaction and loyalty (Anderson et al. 1994), product quality theory (Juran & De Feo, 2010), product cost theory (Harrington, 1987; Tsai, 2010), product safety theory (McLaughlin, 2010), and quality control theory to respond to the central question of the study (Saleh, 2008).

Theories on product quality and customer satisfaction include a discussion of professional practices and procedures intended to contribute to the understanding of product quality and customer satisfaction. Flavio, Filho, and Bonney (2009) and Golder, Mitra, and Moorman (2012) supported Deming's (1982) classical quality control of high-product quality hypothesis. Production management functionaries should aim at measuring, understanding, and improving production process and material flow. Goods and services can be produced in accordance to enhanced safety specifications to meet or exceed prevailing consumer flavor and expectations to enhance revenue acquisitions for businesses. Feigenbaum (1991) and Flavio et al. argued for the adoption of the

importance of production control (PC). PC determines and regulates schedules coordination and commands and monitors material flows and activities in production systems in short-term measures to improve customer satisfaction and promote sustainable consumption (Zaifang & Xuening, 2010).

Relevant to the product cost, Reiner, Natter, and Drechsler (2009) introduced a system dynamics model for testing the product-pricing approach currently used in the global market. The model is an impression on dynamic pricing with the existence of inventory concerns (Reiner et al., 2009). Schmitt (2002, 2010) studied the affect of pricing in the automobile industry and found that the cost of automobiles correlates with the level of quality. Thus, higher quality automobiles cost more due to the amount of safety features involved (Golder, Mitra, & Moorman, 2012; Schaeffer, 2003; Schmitt, 2002, 2010).

On the effect of product cost and product safety, Campbell and Frei (2010) and Terpstra and Verbeeten (2014) argued for effective cost mitigation without compromising product safety and customer satisfaction. The difference in product quality level causes consumers to be diverse in purchasing choices (Farris, Neil, Bendle, Pfeife, & Reibstein, 2010; Slotegraaf & Inman, 2004). In the automobile industry, it takes time and resources to improve quality because of change in prices and product quality levels that affect marginal costs differently. Nonetheless, Bresnahan (1989) alluded that marginal costs are not typically across all firms. In contrast, regardless of cost, poor quality makes consumers dislike the product (Campbell & Frei, 2010; Clark, 1996; Terpstra & Verbeeten, 2014). Hence, high product quality is inseparable from benefits associated

with product costs that do not minimize product safety attributes to consumer satisfaction associated with product safety (Golderet et al., 2012).On the topic of unsafe product, McManus (2009) posited that firms assume that the problems of defective products are the root cause of unsafe conditions as opposed to unsafe production processes. Producers become cynical enough to think that consumers have no significant role in affecting the quality of the products (Saleh, 2008; Venters, 2004). Many high-ranking managers do not allow safety committees to implement safety programs. Based on these business practices, managers wait for an accident to happen before they decide to take action, which negatively affects product quality, consumer satisfaction, and loyalty (Kuo, Wu, & Deng, 2009; McManus, 2009).

On consumerism, Mies (2009) encouraged customers to explore all means of preventing manufacturers from generating defective and harmful products. In the case of equipment malfunction, consumers should confront the producers by meeting the dealers face-to-face to discuss the defective product or bring the matter to the Better Business Bureau.

Regarding safety practices in the workplace, Boyce (2008) argued that ergonomics increases the efficiency, productivity, comfort, and safety of employees and decrease errors, accidents, injuries, and illnesses. Boyce believed that managers must drive their organization through hands-on, participative members who are obligated to drive quality improvement. The effectiveness of management commitment is measured by the use of cost of quality techniques (Juran & Gryna, 1970).

Enhanced product safety to boost customer satisfaction and loyalty at great lengths improved revenue acquisitions for businesses (Chalotra, 2012). McLaughlin (2010) researched customer satisfaction using concepts of product safety theory and posited that manufacturers and designers must anticipate any potential harmful consequences when they introduce new products as their cognizance of the safety issues minimizes the threat to the consumer. The comparative significance of perceived service quality and the relationship between perceived service quality, customer satisfaction, and behavioral purpose using multidimensional methods and concluded that significant proportions of customer satisfaction are substantial, perceptible, and responsive product quality, pricing, and safety (Kim & Lee, 2011). Additionally, Kim and Lee authenticated the importance and cost of customer satisfaction embracing word-of-mouth communication, purchase intentions, and complaining behavior. Kim and Lee encouraged manufacturers, based on their findings, to expand or build on tangibles and responsiveness for the enhancement of customer satisfaction and behavioral intentions to boost revenues or earnings to mitigate product costs.

Design engineers should watch for opportunities to apply their technical knowledge, skills, abilities, and proficiencies to create better consumer products that meet customer satisfaction (Harper & Porter, 2011). Production of enhanced safety products not only satisfy consumers but has a greater propensity for minimizing costs associated with recalls and accidental acts resulting from product defects as a consequence of intentional production or manufacturing of inferior goods and services to the consuming public (Krasnikov, Jayachandran, & Kumar, 2009). Skills and technical approaches used

to produce safe products should account for their exceptional output of successful production and positioning of new products to compliment best practices (Kuo et al. 2009; Wolf, 1986). I extrapolated the various factors associated with the paradigm, which proposed and compared opposing views. Additionally, I examined peer-reviewed research articles in the literature review section of Chapter 2 of this study to respond to the central research question.

Nature of the Study

I used a quantitative cross-sectional survey research design (Frankfort-Nachmias, & Nachmias, 2008) and the descriptive, multiple regression, and mediation statistics techniques (Field 2009) to identify and analyze the relationships among the predictors and provide analysis of the variables in Chapter 3 of the study. The data analysis involved measurements of automobile product-based quality and U.S. automobile customer responses to market surveys (Componation, Youngblood, & Utley, 2008; Hald, 1998; Harter, 1999; Platzer & Harrison, 2009).

Consequently, the purpose was to examine the relationships among key variables of product quality, customer satisfaction, product cost, and product safety as the independent variables and level of customer satisfaction as the dependent variable to discover the relationship that exists between product quality related to car quality and customer satisfaction in the U.S. market. In the examination of the relationship between car quality and customer satisfaction, the product cost and product safety used as mediators. The primary objectives included examination and evaluation of the variables

to uncover the relationship between product (car) quality (IV) and customer satisfaction (DV) in the U.S automobile industry marketplace.

Analyzing the relationships among the variables of interest influenced the level of user-based customer satisfaction with intervening safety-based mediator and cost-based mediators (James & Brett, 1984; Mackinnon, Fairchild, & Fritz, 2007). Hence, the agencies that inspect organizations' processes and systems of control, and conduct tests on products in all stages of distribution feel supported with the result of the study as tools to execute their functions in an enhanced way (Im, 2001, 2003, 2004a, 2004b; Pittenger, 2003).

The reason for selecting a quantitative form of cross-sectional survey research design and descriptive, multiple regression, and mediation statistical forms data analysis for this study was to determine the possible correlations among product quality, product safety, product cost, and customer satisfaction. A cross-sectional survey research design was helpful to ensure validity and generalization. In quantitative research a method, the use of an approach in collecting data is easy if survey data are used (Creswell, 2009; Berry & Parasuraman, 1991). I used Survey Monkey to collect survey data (Aczel & Sounderpandian, 2006; Barry, 2001; Birnbaum, 2004; Jun Woo, Magnusen, & Yu Kyoum, 2014).

In respect to data collection methods, the study encompassed the conducting of an Internet survey with enhanced survey services such as SurveyMonkey, an online research for analysis. Many researchers in different disciplines now take advantage of the features associated with conducting surveys through e-mail or Internet, which are faster to

conduct than telephone interview (Chalotra, 2012; Frankfort-Nachmias & Nachmias, 2008).

Consequently, I used survey-data collection methods using a Likert scale index with survey questionnaires based on a random population sample size of $N = 77$ participating U.S. automobile users. According to the data collection method and strategies, I reduced the population size of automobile users to small cars with passengers of eight in the United States. A smaller number of target sample units of $N = 77$ helped simplify the statistical process and mathematical calculations to arrive at a more valid results for generalization (Nachmias et al., 2009).

When dealing with large survey population data, a random sampling technique provides the best selection of strategy to test the various hypotheses (Creswell, 2009). The technique provided robust methods to analyze the data to respond to the central question to assure validity and generalizability (Creswell, 2009; Givens, 2008; Johnson & Onwuegbuzie, 2004; Frankfort-Nachmias & Nachmias, 2008). In addition, the procedure is the best method in explaining how and why the phenomena (Creswell, 2009).

Definitions

Consumerism: In this context, it is a socioeconomic paradigm that demonstrates the motivation, order, or ideology behind the way consumers acquired more goods and services due to choice of needs and wants encompassing customer loyalty, product safety, and branding and positioning of the product in the marketplace (Wang, Du, & Li, 2004; Wang, Tsai, Chen, & Chang, 2012; Ward & Poling, 2005).

Customer satisfaction: The term refers to the DV used to find the relationship between car quality and customer satisfaction in the U.S. automobile market (Batra & Athola, 1990; Boyle & Lathrop, 2008; Johnson, Gustafssonb, Andreassenc, Lervikc, & Jaesung, 2001; Li, Lin, & Lai, 2010).

Kaizen: Kaizen is a Japanese word for perpetual improvement through identification and elimination of waste in a manufacturing industry. In addition, the term applies to the service industry; however, the service industry was not used in the scope of this study (Bodek, 2010; Graban & Joe, 2012; Hamel, 2010; Maurer, 2012; Scotchmer, 2008).

Kanban: The word *Kanban* comes from the Japanese word for *card*. This is one of the cornerstones of *Just-In-Time* approach (Anderson, 2003, 2010).

Level of customer satisfaction: The variable reflects the DV of customer satisfaction to find the relationship between car quality and customer satisfaction in the U.S. auto market. DVs are the response variable, measured variable, responding variable, explained variable, outcome variable, or output variable (Collins, McDonald, & Mousa, 2007; Debra, 2005; Deming, 1982a; Giese & Cote, 2000; McClenahen, 2006; Wilson, 1999, 2003).

Mediator variable: This term relates to the variables that are used to test the relationship between the independent and the DVs through intervention. If the hypothesis is correct, then the correlation between the variables should be nonzero in value (Green & Salkind, 2011). In this study, product cost and product safety were the mediating variables (Barjaktarovic & Jecmenica, 2011).

Multicollinearity: Multicollinearity is a statistical phenomenon in which two or more IVs in multiple regression models are highly correlated (Caracelli & Greene, 1993; Field, 2009; Mohr-Jackson, 1998; Monroe, 2006).

Product cost: In the automobile industry, the term is the overall expenditure incurred by manufacturers of consumer products including fulfillment costs. These factors help manufacturers' wholesale and retail prices to identify and present the price of each car to customers (Burgess, 1996; Campbell & Frei, 2010; Chen, 2001; Freiesleben, 2004; Jain & Liebesman, 1985; Jeffery, 2003; Saad & Siha, 2008; Saleh, 2008).

Product quality: This is the IV in this study to predict the outcome of the DV, the level of customer satisfaction. IVs are the predictor variable, mediator, controlled variable, manipulated variable, or an explanatory variable (Ball, 2006; Frankfort-Nachmias & Nachmias, 2008; Freiesleben, 2004; Segar, 1981).

Pull system: Pull system is the opposite of push system. Pull is a technique when production manufacturing companies and/or businesses with production lines use the technique based on customers' orders on product service demands in the marketplace (Deardorff, 2006; De Mast, 2006; Evans, 2005).

Push-system: This is a term use in professional practice on production process (Senior, 1999; Singleton & Straits, 2003; Turel & Serenko, 2006).

Quality: In business, engineering, and manufacturing, quality means noninferiority or a superiority of the product. It meets or exceeds customer or other user expectations (De Feo, 2001; Deming, 1982b; Finlay, Hackman, & Schwarz, 1996).

Quality cost: The phrase relates to the identification of manufacturer's costs that reflects overhead costs of finished products per unit after all attributes that drive overall measures of customer satisfaction and product loyalty to arrive at an affordable price compared with product costs (Atkinson, Hamburg, & Ittner, 1994; Atkinson, 2005; Eroglu & Machleit, 1990).

Safety: Safety is construed freedom from danger. It is inherent protection from, or from being exposed to, the risk of harmful products. The term in this study relates to safety associated with less than eight passenger automobiles' safety in the United States (Cannas & Noordhuizen, 2008; Lakeman, 1997; Malone, 2000; Meyerson, 2003).

Takt-time: Takt-time relates to a German term expressing an action based on regular recurrence and is synonymous with the word "rhythm" in English. In manufacturing rhythm sets the pace of production to match customer demand for minimizing the inventory cost. Takt-time is the measure of using available production time, divided by the production quantity requirement (Cudney, 2009; Onwuegbuzie, & Leech, 2005).

Total quality control (TQC): The process in which entities review entirely the quality of all factors involved in production. The purpose of TQC in this study was to find enhanced strategies to minimize waste, improve quality, and lower manufacturing costs to mitigate price levels of finished products (Feigenbaum, 1991; Oxenfeldt, 1950; Roos, 2002; Schwarzer1999).

Total quality management (TQM): The purpose of TQM is to identify and eliminate variations in production in order to provide a better quality product while

minimizing costs (Flynn, 1992; Garvin, 1988; Gerstner, 1985; Gryna, 2001; Golder, Mitra, & Moorman, 2012; Gryna, 2001).

Value stream mapping (VSM): Value stream mapping is a process documentation, which shows the flow of material and information as a product or service move through production processes (Kessler, 2003; Luo Xueming, & Bhattacharya, 2006; Rhodes, 2003).

Assumptions

The statements outlined below are necessary in the context of the study because the assumptions relate to product quality, product cost, product safety, and customer satisfaction in the U.S. automobile market place. The below assumptions cover the concepts of product quality, product cost, product safety, and customer satisfaction examined through the theoretical lenses of Anderson et al. (1994), Juran and De Feo (2010), Tsai (2010), McLaughlin (2010), and Saleh (2008) supported by other peer reviewed articles with the following assumptions for the study:

1. Participants were able to understand and answer honestly survey questions on quality and customer satisfaction, in which 80 % return rates of $N = 77$-sample size was adequate to conduct proper statistics analyses and tests.
2. Quantitative measurement modeling used mediation regression helped establish the relationship between product quality and customer satisfaction.
3. Product quality factors were identified to improve future car productions based on validity and the generalizable test results.

Scope and Delimitations

Theoretical emphasis of product quality, product cost, product safety, and customer satisfaction was contingent upon correlations that existed between product quality and customer satisfaction. Using the Likert form of surveys, the examination of these variables involved the use of nationwide data collection of surveys in the U.S. automobile market for analysis. I extensively extrapolated these factors in this section in Chapter 3.

Strategies of inquiry segment encompassed quantitative cross-sectional survey research design and regression mediation statistical methods. I used the techniques with Likert scale (nominal) methods to design questionnaires as instruments for the survey and experimentation of a more generalized population (Nachmias et al., 2009; Stewart, 2003; Strickland, 2003; Swartz & Hancock, 2002; Terpstra, 2008; Wilson, 2003). The quantitative approach deals with less in-depth, but broader information across a large number of cases (Duffy, 2000a, 2000b, 2002; Duncan, 2003; Eaton, 2002). The approach was primarily useful for testing predetermined concepts and hypotheses, which make up a theory through a deductive process as in the case of experimental designs and nonexperimental designs (Adler & Zarchin, 2002; Barry, 2001; Bowker, 2004; Chen, 2001; Creswell, 2009; Dow, Serenko, Turel, & Wong, 2006).

Using a quantitative approach, I isolated variables in order to merge, control, and precisely analyze the research data. Furthermore, I conducted randomized U.S. automobile customer satisfaction survey, using SurveyMonkey to examine responses to predefined questionnaires for statistical measurements and analyses. SurveyMonkey was

an Internet survey service provider who accessed the data through electronic communication devices to eradicate possible researcher biases.

I ensured that the study was restricted to the use of data retrieved from responses by random U.S. automobile customers. Based on data collection techniques discussed, I retrieved the data in conformity of institutional review board (IRB) guidelines for analysis (Nachmias et al., 2009) to minimize systematic error or biases associated with sample cases and results from the study. The methodologies used in this study are consistent with existing techniques established for testing survey responses by consumers of goods and services in the U.S. auto market (Carr, Muthusamy, & Lee, 2008; Fisher-Vanden & Terry, 2009; Yanmei et al., 2009).

Limitations

I conducted the survey through the Internet. The target population consisting of $N = 77$ randomly selected U.S. automobile customers. A statistical causal-comparative multiple regression method was applied to decide rationale, or reasons, for consumer preferences associated with automobiles ranging from small vehicles with passengers less than eight. The quantitative methods identified are robust and widely accepted by researchers; hence, I analyzed the research question and hypotheses for validation through tests of the data for reliability and generalizability of the result. Manufacturers had hundreds of customers, possibly scattered around the nation, and the only way they can determine the level of customer satisfaction is by conducting a survey.

I personally organized the research question and strategies for interviews and data analysis. The use of survey method to test hypotheses is helpful, because surveys require

brief and comprehensive inquiries and instructions (Frankfort-Nachmias & Nachmias, 2008). However, not all researchers have the opportunity to investigate or request for more information or to clarify the answer (Creswell, 2009).

The phenomena was quantitatively measured to assure validity and generalizability contingent upon the weighting of the responses using Cronbach's alpha α = > .8. The reason was that U.S. customers might provide certain responses. Whereas automobile customers in other nations might have provided different answers.

As the methods and process of statistical measurements function collectively with the operational definitions of product-quality and cost models, the outcomes of the data analysis influenced the empirical applicability. The IVs of estimated quality and cost control in the regression analysis reflected the way the variables were distinct, considered, and measured. Hence, high value of alpha α such as Cronbach's alpha α = > .8 were used to assure reliability and validity of results of this research inquisition.

I did not use incomplete response data because the use of other proxies for the automobile customer market that contains the tendency to have a negative adversarial impact on the results of this study. Empirical data were used in testing hypotheses, which relate with customer satisfaction, validate and generalize the findings and results of the research in the U.S. automobile market.

If spurious or false correlations existed in this study, the result may not be applicable to other nations, as this type of relationship would not true link or have a perfect correlation due to variances related to consumer behaviors, preferences, and

affordability in other capital markets in the global markets Frankfort-Nachmias & Nachmias, 2008).

Hence, digression from normality and subsistence of autocorrelation will shed or emit doubt on the reliability of assumptions and conclusions from the estimated regression coefficients. Consequently, I reported the results of the data of survey responses and test for normality. I used regression residuals to probe or examine any autocorrelations to check and identify any evidence of the existence of autocorrelations in the regression paradigm. Determination to alter and reappraise the data summarized was undertaken where necessary to describe the effects of the autocorrelation.

Significance of the Study

The significance of the study reflects the importance of the US automobile industry and the need to know what creates customer satisfaction. The primary objectives included examining and evaluating the variables in this study to uncover the relationship between car quality and customer satisfaction in the U.S. automobile industry. Furthermore, by using multiple regression statistical techniques, I measured the predictors to find results to boost the significance of the study.

Significance to Practice

The result of the empirical inquisition will provide academic researchers, automobile manufacturing professional managers, and stakeholders' insight of how automobile quality, cost, and safety factors may be used to meet and enhance customer needs. As previously stated, the results of the study will use the U.S. market as proxy for

future research studies to promote automobile quality, cost control, and product safety for customer satisfaction.

Additionally, the significance of the study reflects the importance of safety associated with product quality for U.S. automobile customers. Product quality is not only beneficial to these customers, but also advantageous to the manufacturing industry. This research involved critical thinking and assessment of the quality management and consumerism theories to discover gaps in the literature to explain philosophical views on different approaches to improve product quality to enhance consumer satisfaction associated with U.S automobiles.

Significance to Theory

Consumerism in this context is a socioeconomic paradigm that demonstrates the motivation, order, or ideology behind the way consumers acquire more goods and services in great amounts because of the choice of needs and wants encompassing customer loyalty, product safety, and branding and positioning of the product in the marketplace. Data obtained mirroring customer or consumer satisfaction was used to capture top management's attention for the enhancements of product quality, cost control, and unsafe product mitigation programs (Chaudha, Jain, Singh, & Mishra, 2011; Gosnik & Jujica-Herzog, 2010; Harper & Porter, 2011; Jujica-Herzog, 2010; Lofgren & Witell, 2008). Additionally, the obtained data will help advance practices in engineering management to expand manufacturers' knowledge of product quality and consumerism concepts (Harper & Porter, 2011). Management of businesses focus on these essential programs has been insufficient given the various recorded lapses in customer satisfaction

and levels of automobile product safety recalls (Krivobokova, 2009). The results of this study may provide usable information for management practitioners, researchers, and consumers. This study was focused on the automobile industry, but may also benefit manufacturing entities and administrative support activities seeking to improve quality and business performance (Chaudha et al., 2011; Klaus & Maklan, 2013).

Consequently, this study may help stakeholders who may not directly engage in managing, producing, or marketing products, but may have the need to know about product quality for skill set enhancements. Furthermore, practitioners and academics may use parts of the study to review, discuss, confer, argue, and propose new ways for integrating quality cost that promotes customer experience and satisfactions to enhance a companies' market share to position high-quality safe products in the marketplace while enhancing their bottom-line.

On the production of quality automobiles, Knudsen (2010) and Wolf (1986) researched the process approach and argued that engineering concepts and quality management have brought about changes in the automobile industry. Enhanced product quality to increase market share and revenue acquisitions for businesses is important (Besio & Pronzini, 2010). The results from this study may be beneficial because positioning safe, high quality products in the U.S. automobile market will benefit management, organizations, and consumers because of customer loyalty and satisfaction (Tsekeris, 2010). Process approach follows the notion that an organization consists of interrelated and mutually dependent systems. Organizations can improve their

performance by using a process approach or consistent operation techniques to enhance customer satisfaction and meet revenue targets (Glaser, 2010).

Customer satisfaction is the sense of contentment that consumers experience when comparing their introductory expectations with the actual quality of the acquired product (Krivobokova, 2009). Therefore, this study may produce realistic information for management staff and all levels of employees in an organization. Managers, engineers, and employees alike should be able to use the content and findings of this study in order to learn or familiarize themselves with the process of quality management, quality costs, and organizational functions to understand strategic goals of the company.

Major function of management processes is to lead organizations so that objectives for product quality, cost control, and safety standard goals maybe reached (Chaudha et al., 2011; Gosnik & Jujica-Herzog, 2010; Harper & Porter, 2011; Lofgren & Witell, 2008). This study may offer a wide variety of opportunities, from which management practitioners would be able to share common responsibility of increasing market share by investing in quality product improvement, which may influence a positive societal change (Chaudha et al., 2011; Gosnik & Jujica-Herzog, 2010; Harper & Porter, 2011; Jujica-Herzog, 2010; Lofgren & Witell, 2008).

Product quality is the life-support of quality control and it ensures that consumers are able to buy high quality products or services with long-lasting reliability (Feigenbaum, 1945; Feigenbaum & Feigenbaum, 2003, 2009). Product quality attains improved processes that produce a safe uniform output of products. Processes reduce

mistakes and rework, as well as reducing waste of labor, machine-time, and materials and thus increase output with less effort (Chua, 2008; Eckert & Hughes, 2010; He, 2010;).

The field of engineering and scholar practitioners as well as consumers may benefit from this research because I provide critical analysis of theories on quality management and product cost to discover major gaps in literature on the beliefs of cost management efforts (Eckert & Hughes, 2010; He, 2010; Chua, 2008). The explanation of philosophical views on different approaches to improving product quality given the investment needed to enhance product quality is significant to the body of academic research.

Potential Implications for Positive Social Change

Social change hypotheses are harmonious with socioeconomic factors that are congruent upon capitalists essentials associated with high-quality and durable products, product costs, and product safety that allows for consumer product safety and affordability leading to customer satisfaction. Investigations and findings drawn from this study served to enhance contemporary foundation for best practices for business entities for product quality, product safety, and mitigations of product costs benefiting businesses and consumers (Chaudha et al., 2011).

These propositions associated with product safety improvements will help practitioners to understand roles required of engineering and production line management to be effective in promoting high-quality products for consumers at affordable costs. The results of the study will potentially lead to mitigation of mortality rates associated with

vehicular hazards related to unsafe automobile productions in the United States (Cudney, 2009).

Additionally, the results will foster a positive social change in the United States because it is a proxy for enhancing consumer product fulfillments in global markets. The increase in automobile transportation efficiency and effectiveness attributable to the validity of the results of this research investigation mean fewer accidents and lower repair costs (Harper, 1993; Luo Xueming, & Bhattacharya, 2006; Platzer & Harrison, 2009).

These factors are tantamount to finding solutions that promote elements that have the propensity to lead to positive social change. This is because implications for social change include helping manufacturers and product designers to understand better the customer needs in acquiring high-quality automobiles at affordable prices (Glaser, 2010; Platzer & Harrison, 2009; Sajeva & Jucevicius, 2010).

The results of the study could be a foundation or part of the solution identifiable for building high quality products that provide robust levels of safety standards to assure positive social change. The most significant gains in product quality and productivity are consumers' satisfaction on goods and services offered for sale (Salegna & Fazel, 2011). This is because safety products are tantamount to saving lives and maximizing corporate social responsibility. These concepts point toward quality management based on selection and application of the best solutions for solving industrial and organizational problems (Suma & Nair, 2008; Srinivasan & Hanssens, 2009; Voas, 1999).

Summary and Transition

The fundamental objective of the study was to investigate the phenomena of the relationship between product quality encompassing car quality and customer satisfaction in the U.S. automobile industry marketplace using product cost and product safety as mediators. Through the lens of Anderson et al. (1994), Juran and De Feo (2010), Tsai (2010), McLaughlin (2010), and Saleh (2008), I analyzed product quality, product cost, product safety, and consumer satisfaction. Additionally, I synthesized peer-reviewed articles concerning quality control and higher lifetime value of products to analyze the views and findings of other total management theorists in the literature segment of Chapter 2 to respond to the central questions of the study.

Using a multiple regression model, I determined the predictors to uncover the results that may provide academic researchers, automobile manufacturing professional managers, and stakeholders' insight and factors that inform high-quality automobile products, cost, and safety factors in the U.S. markets. The result meets and enhances consumer needs in capital markets using the U.S. market as a proxy for the global markets.

Positive social change constructs provided for contrasting and synthesizing product quality, product cost, product safety, and customer satisfaction theories. This helped to uncover fundamental challenges in the U.S. automobile industry so that propositions of enhanced contemporary solutions can be applied to reduce the number of product recalls associated with substandard product safety standards, costs related with

product malfunctions and recalls to the industry and customers of automobiles. Chapter 2 includes the literature review and Chapter 3 includes the research method.

Chapter 2: Literature Review

In this literature review, challenges in managing automobile design and production continue to emerge in peer-reviewed articles relevant to the study. Consumers compare product quality, product cost, and product safety features of competitive offerings before acquisitions. High costs were found to be associated with product recalls, car repairs, injuries, and deaths due to unsafe product designs and/or inferior product quality (NSC, 2015).

I identified pricing effects on product quality, product cost, and product safety on customer satisfaction in the U.S. automobile industry as one of the important factors and hypothesis in management theory and professional practice for the discussion (Bresnahan, 2010; Harper & Porter, 2011; He, 2010). Therefore, difficulties in managing high- quality consumer products, quality control, and mitigating product cost to enhance product safety to meet or exceed customer satisfactions and/or customer loyalty and company revenue objectives continue to emerge (Eckert & Hughes, 2010; Hill et al., 2011). Quality control influence durability of products (Bolton, 1998; Saleh, 2008; Hogan et al., 2002; Tellis, Yin, & Niraj, 2009) to assure customer satisfaction and product loyalty (Cameroon, Moizer, & Pettiniccbio, 2010).

The absence of pragmatic implementations and monitoring of effective high-quality product control, total management concepts, and measures for production operations undermine the ability for cost and safety product edifications (Li et al. 2010). This allows for inferior products and dismal market positions regardless of levels of product branding in the marketplace (Aggogeri & Gentili, 2008; Atkinson, Hamburg, &

Ittner, 1994; Ball, 2006; Berry, Leonard, & Parasuraman, 1991; Bresnahan, 2010; Jun Woo, Magnusen, & Yu Kyoum, 2014; Juran & De Feo, 2010; Natarajan, Soundararajan, & Jayakrishnan, 2013; Salegna, & Fazel, 2011; Setó-Pamies, 2012; Xu, Leung, & Yan, 2013).

Finding the relationship among product quality and product cost with two mediators was a phenomena that had been great a paradigm with effects on quality, cost, and safety at the level of customer satisfaction in the U.S automobile industry (Baron & Kenny, 1986; Burgess, 1996; Chua, 2008; Eckert & Hughes, 2010; He, 2010; Xu et al., 2013). Hence, the central focus for examination in this research studies.

This research study encapsulated the purpose of empirically examining the relationship that existed between product quality encompassing car quality the IV and customer satisfaction, the DV using product cost and product safety as mediators. In this segment, I identified the research method and designs used to measure and analyze the various research questions in the study. The need for finding sustainable constructs and price attributes (Li et al., 2010; Fetscherin & Toncar, 2009) to enhance product quality that mitigates costs to meet customer satisfaction in the U.S. automobile marketplace was the paramount objective in this research study.

I examined, analyzed, and extrapolated the various factors in peer-reviewed articles to respond to the interaction of the factors associated with customer satisfaction in the manufacturing environment and ascertained how automibile safety can be implemented. Product quality, product cost, product safety, customer/consumer satisfaction, and customer loyalty theories provided in-depth understandings on dynamic

problems with production costs and product safety, pricing, and customer satisfaction modeling for engineering and product management (Fetscherin & Toncar, 2009; Li et al., 2010; Mahapatra, Kumar, & Chauhan, 2010).

The theories provided insight to associated drivers and implications on business and product performances that are not yet widely understood in academia and in the professional environment (Hill et al., 2011; Mahapatra et al., 2010). Hence, there is the need for higher executives in the upper management echelon of organizational entities seek help from outside. The dynamic difficulties associated with the ability to learn how to improve on high-quality, productivity, and competitive positioning of good and services to consumers demands past experiences to enhance consumer demand and customer satisfaction (Huehn-Brown, & Murray, 2010).

In this segment, I review and discuss the various peer-reviewed articles in support of the study. I have provided in-depth analysis and extrapolated on the constructs, validity of the algorithms, and models that are appropriate to the academic and professional community. This includes the need for the production of safe automobiles and the level of consumer satisfaction on product quality that enhances customer behavior. I outline the various research questions and associated hypotheses used to quantitatively examine and test the relationships between product quality, product cost, and product safety with customer satisfaction.

Literature Search Strategy

I include in this section an analysis of peer-reviewed articles on the constructs, validity of the algorithms, and models that are appropriate to the academics and

professional community on the production of automobiles to meet consumer satisfaction on product quality. I outline the various research questions and associated hypotheses used to quantitatively examine and test the relationships between product quality, product cost, and product safety with customer satisfaction.

The literature review includes discussions on researches and studies related to the industrial engineering theory in managing quality and productivity systems (Salegna & Fazel, 2011). The concept of quality systems encompass theories central to the evolution and implementation of labor cost-saving technique, product quality enhancement, and safety measure. I review and compare and contrast various classic theories and contemporary syntheses of beliefs on industrial engineering and sciences published in scholarly books and journals.

I researched articles and books and accessed the following world-wide web internet databases in the Walden University library: ABI/INFORM Complete, Business Source Complete/Premier, Emerald Management Journals, Management & Organization Studies: a SAGE full-text collection, SAGE Premier, Academic Search Complete/Premier, ProQuest Central, Science Direct, ICPSR - Inter-University Consortium for Political and Social Research Datasets, and ProQuest Dissertations & Theses. The following are the various key search terms: *automobile industry and automobile quality, product safety and product cost, automobile industry and harmful products, quality management and automobile industry, automobile industry and life-cycle cost, quality management and life-cycle cost, quality management and cost effectiveness, quality management and work attitudes, total quality management and*

profitability, total quality management and purchase intention, total quality management and production, customer satisfaction and customer loyalty, total quality management and customer relation, consumer confidence and quality service, customer satisfaction and consumer research, cost of poor quality and cost effectiveness, customer satisfaction and cost effectiveness, customer satisfaction and profitability, and *customer satisfaction and purchase intention.*

Theoretical Foundation

Product safety and consumer satisfaction associated with product quality and cost control in the United States is one of the phenomena that have aroused research among academic researchers/scholar practitioners. Quality control product management practitioners look for solutions to meet consumer product-safety and customer satisfaction demands (Bolton, 1998; Cameroon, Moizer, & Pettiniccbio, 2010; Hogan et al., 2002; McLaughlin, 2010; Tellis et al., 2009; Xu et al., 2013).

Consequently, there is a need for design engineers and product management practitioners to use skills set based on the application of enhanced technical knowledge that encapsulates product quality, cost control, and product safety to meet customer expectations and satisfaction (Anderson et al. 1994; Harper & Porter, 2011; Juran & De Feo, 2010; Tsai, 2010; McLaughlin, 2010; Saleh, 2008). Therefore, the premise of the theoretical lens of the study encapsulated investigating the relationships of quality products with an emphasis on the durability of automobile quality attributable to product quality and quality control theories are examined (Juran & De Feo, 2010; Natarajan,

Soundararajan, & Jayakrishnan, 2013; Salegna & Fazel, 2011; Setó-Pamies, 2012; Saleh, 2008; Xu et al., 2013).

Consequently, I used attributes of five theories as the foundation of the premise for the study to examine factors associated with customer satisfaction and higher lifetime value theory (Anderson et al., 1994), product quality theory (Juran & De Feo, 2010). In addition, I examined product cost theory (Tsai, 2010), product safety theory (McLaughlin, 2010), quality control theory (Feigenbaum, 1945; Saleh, 2008), and customer satisfaction theory to respond to the central questions of the study (Chaudha et al., 2011).

I researched, evaluated, and synthesized the relationship that exists among product quality encompassing car quality and customer satisfaction using product cost and product safety as mediators to identify the best factors that can be established to meet customer satisfaction of automobils in the U.S. automobile market (Saleh, 2008). The reason was attributable to classical and contemporary theories that discuss professional practices and procedures meant to add to the understanding of product quality and customer satisfaction for U.S. automobile consumers (Besio & Pronzini, 2010; Knudsen, 2010; Tsekeris, 2010, Wang, Tsai, Chen, & Chang, 2012; Wolf, 1986).

Evaluation of these practices and procedures in the peer review articles will complete and support the examination of the manufacturing input and output to find answers to the hypotheses of the study. Research has uncovered the importance of finding answers to the central problem of finding the relationship between car quality and customer satisfaction in the U.S because there are no consistencies in establishing the

relationships among quality-based, cost-based, safety-based products, and customer satisfaction (Besio & Pronzini, 2010; Knudsen, 2010; Tsekeris, 2010; Wang, Tsai, Chen, & Chang, 2012; Wolf, 1986).

Literature Related to Key Variables and Concepts

I used car quality and customer satisfaction, as well as the cost and safety as mediators for the study by examining the hypotheses of Product quality findings on product quality, production failures, and consumer complaints (Juran & De Feo, 2010). The reason was researchers had investigated classical and contemporary theories associated with the need for high quality of consumer products encapsulating the hypothesis of Quality control (Anderson, Fomell, & Lehmann, 1994), product quality and customer satisfaction (Fetscherin & Toncar, 2009; Juran & De Feo, 2010; Tsai, 2010; McLaughlin, 2010; Saleh, 2008; Verhoef, & Lemon, 2013). Consequently, theories of product quality, product cost, product safety, and customer satisfaction were examined, synthesized, and presented in this segment of the research study to underscore the need for examining and uncovering the relationship that exist between product quality and safety to promote consumer satisfaction.

This study merged constructs of classical and contemporary theories of product quality, quality control, product cost, product safety, and consumer satisfaction to examine the need for enhanced total quality management hypotheses to improve car quality in the U.S. automobile market (Mahapatra, Kumar, & Chauhan, 2010).

Product Quality and Customer Satisfaction Constructs

I examined quality control hypothesis and found that Saleh (2008) argued for establishments of enhanced quality control of products to boost customer satisfaction and loyalty in the marketplace. While investigating aspects of relationship of product quality and I found that product quality is durability of products that acts as catalyst for consumer demands of safe products and customer satisfaction. These factors provide the ability for businesses to enhance their bottom-line through sustained revenue acquisitions to meet or exceed stated revenue objectives (Gitman & McDaniel, 2005).

Flavio, Filho, and Bonney (2009), Golder, Mitra, and Moorman, (2012) supported Deming (1982) classical quality control of high-product quality hypothesis. Their findings posit that production management functionaries should aim at measuring, understanding, and improving production process and material flow. Good and services can be produced in accordance to enhanced safety specifications to meet or exceed prevailing consumer flavor and expectations to enhance revenue acquisitions for businesses. Feigenbaum (1991) and Flavio, Filho and Bonney (2009) argued for the adoption of the importance of production control (PC). Their findings posit that PC determines and regulates schedules, coordination, commands and monitor material flows and activities in production system in short-term measures to improve customer satisfaction and promote sustainable consumption (Zaifang & Xuening, 2010).

Flavio et al. (2009) and Verhoef and Lemon, (2013) believed there is a way to integrate product quality and quality control for repetitive production systems on the production line to boost customer satisfaction. Interestingly, Hohner, Kagemann, and

Inman (2010) findings did not find or mention any practical method(s) for establishing the relationship between the product quality and the quality control. Raturi and Evans (2004) and Xu, Leung, and Yan, (2013) believed consumers have the final say on quality, which means that quality efforts not only focus on simply meeting the specifications and reducing defects and variations but also ensuring the reliability of products when they reached the consumers.

Increased product durability or design lifetime mapped into an additional flow of utility from the system (Saleh, 2008). Product quality has direct link with positive effect on market share (Tellis, Yin, & Niraj, 2009). Improving insights of the quality of goods motivate customer satisfaction (Cameroon, Moizer, & Pettiniccbio, 2010). Hence, quality impact on customer satisfaction affects higher lifetime value for consumers and businesses (Bolton, 1998; Hogan et al., 2002; Fetscherin & Toncar, 2009; Verhoef, & Lemon, 2013).

Superior product quality (Besio & Pronzini, 2010; Knudsen, 2010; Tsekeris, 2010, Fetscherin & Toncar, 2009; Wolf, 1986) lead to good reputation of firms (Yen-KuandKung-Don, 2009) hence, great number of CEOs establish strategic goals for quality improvement and performance monitoring to improve product quality (Joanna, Lockee, & Bass, 2008). Therefore, taking corrective actions to improve customer perception of quality changes is of paramount importance because the strategies motivate consumer behaviors to incremental revenue acquisitions (Iyer & Kuksov, 2010).

Herrington and Weaven (2009) echoed Feigenbaum (1991) findings and argued for the introduction of quality control and high-quality production to appraise product

safety that leads consumer satisfactions. The postulation of Weaven (2009) contain a range of diversified knowledge of quality product and services, such as total quality control, buyer's profile, quality responsibility, system approach to quality, quality assurance inspection, modern quality-control equipment, and product reliability. These concepts argue for product control systems that minimize product cost without negatively compromising on product costs so that consumer satisfactions related to safety achieved (Mahapatra, Kumar, & Chauhan, 2010; McCollough, 2010).

Product Cost and Customer Satisfaction Constructs

Examining product cost theory found Tsai (2010) research that lectured in support of the concept that consumers possess more positive insights of product cost and are more capable of justly evaluating product quality through loyalty. Factors of product cost theory allow researchers understand the reasons attributable to consumers' insights on product costs. U.S consumers (Besio & Pronzini, 2010; Fetscherin & Toncar, 2009; Knudsen, 2010; Tsekeris, 2010; Wolf, 1986) are more capable of evaluating costs associated with various types of good and services offered for sale in the market place. Hence, consumers' weight benefits associated with these products to evaluate levels of satisfaction based on product safety proportionate or commensurate to loyalty before acquisitions are completed (McCollough, 2010; Slotegraaf & Inman, 2004; Tsai, 2010).

With the awareness of these phenomena the retail sector in the U.S. automobile market (Besio & Pronzini, 2010) has become highly competitive and saturated with large shopping. Businesses have now awakened to the intense debate on product safety hence mercantile outlets strive to entice consumers to goods offered through competitive low

prices and improved product quality (Chebat, Davidow, & Borges, 2011; Tsai, 2010). These constructs greatly enhance customer satisfaction because of high-quality and safe products (Slotegraaf & Inman, 2004).

Heide and Weiss (1995), and Torres and Tribó (2011) believed that switching costs were first defined as the potential cost incurred by the change in hands from one provider to another. Dick and Basu (1994) suggested that switching costs include monetary expenses and nonmonetary costs as well as revenue losses resulting from product loyalty. Hence, producer and customer relations, routine and transaction arrangements may evolve into a form of switching costs so that long-term gains and market share increments should be encouraged (Jap & Ganesan, 2000; Torres, & Tribó, 2011). These findings are important because the rationale for motivating product quality producers can be encouraged due to the ability to acquire consumer satisfactions and loyalty due to switching costs to enhance brand awareness to boost consumer safety satisfaction (Knudsen, 2010; Tsekeris, 2010; Yanamandram & White, 2010).

Jalilvand, Samiei, and Mahdavinia, (2011) explained that brand awareness refers to the strength of a product's perceive by consumers is an essential part of brand equity. Various levels of brand awareness, ranging from simple recognition of the brand to dominance, refer to the condition where the brand is subject to recall (Aaker, 1991). Keller (1993) defined brand awareness as the ability of the buyer to recognize that a brand is a member of product categories, because brand recall means the ability of customers to remember the undesirable. Chang and Liu (2009) examined Aaker's brand equity model to determine the actual effect of its dimensions on purchase intention.

Brand awareness plays an important role in consumers' decision-making process. Brand associations represent the basis for procurement decisions and benefit the producer and customers (Aaker, 1991). Aaker posited that brand associations help firms process and retrieve information, and differentiating the brand and by motivating consumers and motivate consumers to buy and build confidence on product, creating positive attitudes, and providing a basis for budgets (McCollough, 2010; Yanamandram & White, 2010).

Hassan, Hamid, Muhammad, and Rahman (2010) argued that brand loyalty based on personal perspectives influence consumers to be loyal to the brand. Behavioral perspectives induce consumers to remain loyal to the brand as replicated in the purchaser's intentions. Thus, consumers' intellectualize brand loyalty on the basis of a behavioral perspective meaning that consumers' brand purchase intention correlates with awareness, associations, perception of quality and loyalty (Chang & Liu, 2009; Chebat, Davidow, & Borges, 2011; Torres, & Tribó, 2011; Yanamandram & White, 2010).

Product Safety, Product Cost, and Customer Satisfaction Factors

Reiner, Natter, and Drechsler (2009) introduced system dynamics model for testing product-pricing approach currently used in the global market. The model is an impression on dynamic pricing with the existence of inventory concerns (Reiner, Natter, & Drechsler, 2009). Schmitt (2002, 2010) studied the affect of pricing in the automobile industry and found that the cost of automobiles correlates with the level of quality. Thus, automobiles with higher level of quality cost more due to the amount of safety features involved (Golder, Mitra, & Moorman, 2012; Schaeffer, 2003; Schmitt, 2002, 2010).

Campbell and Frei (2010), and Terpstra, and Verbeeten, (2014) respective studies argue for effective cost mitigation without compromising on negative product safety and customer satisfaction impacts. The difference in product quality level makes consumers to be diverse in purchase choices (Farris, Neil, Bendle, Pfeife, & Reibstein, 2010; Slotegraaf & Inman, 2004). In the automobile industry, it takes time and resources to improve quality because change in prices, and product quality levels affect marginal costs differently. Nonetheless, Bresnahan (1989) alluded that marginal costs are not typically across all firms. In contrast, regardless of cost, poor quality makes consumers dislike the product (Campbell & Frei, 2010; Clark, 1996; Terpstra & Verbeeten, 2014). Hence, high-product product quality is inseparable from benefits associated with product costs that do not minimize product safety attributes to consumer satisfaction associated with product safety (Golder, Mitra, & Moorman, (2012).

These findings support McLaughlin (2010) product safety postulations, which extensively argued against allowing unsafe products clambering into customers' backyards and other aspects of the environment because of unsafe products due to businesses lowering product quality benchmarks to mitigate product costs. Consumers want long-lasting, safe products in which manufacturers and designers should anticipate any potential harmful consequences when they introduce new automobiles (McLaughlin, 2010).

McManus (2009) posited that firms assume that the problems of defective products are the root cause of unsafe conditions as opposed to unsafe production process. Producers become cynical enough to think that consumers have no significant role in

affecting the quality of the products (Saleh, 2008; Venters, 2004; Venters, 2004). Many high-ranking managers do not allow Safety committee to implement safety programs. Unfortunately, management of these business entities waits for an accident to happen before they decide to take action, which negatively affects product quality, consumer satisfaction and loyalty (McManus, 2009; Kuo, Wu, & Deng, 2009).

Mies (2009) encouraged customers to explore all means of preventing manufacturers from generating defective and harmful products. In the case of equipment malfunction, consumers should confront the producers by meeting the dealers face-to-face to discuss the defective product or bring the matter to the business bureau. Boyce (2008) argued that ergonomics increase the efficiency, productivity, comfort, and safety of employee, and decrease errors, accidents, injuries, and illnesses. Boyce believed that managers must drive their organization through hands-on, participative members who are obligated to drive quality improvement. The theory suggested that the effectiveness of management commitment measured by the use of cost of quality techniques (Juran & Gryna, 1970). Hence, most product quality failures are traceable to the doors of management as controllable failures are not merely the result of incompletely meeting the criteria for operator self-control; they extend to other matters which influence greater the incidence of quality failures (Kuo, Wu, & Deng, 2009).

Customer Satisfaction and Customer Loyalty

Chalotra (2012) researched into consumer satisfaction and customer satisfaction hypotheses found usages of product safety to boost customer satisfaction and loyalty at great lengths to improve revenue acquisitions for businesses. McLaughlin (2010)

researched into customer satisfaction using Product safety theory concepts and posited that manufacturers and designers must anticipate any potential harmful consequences when they introduce new products as their cognizance of the safety issue minimizes the threat to the consumer (Besio & Pronzini, 2010; Knudsen, 2010; Tsekeris, 2010; Wolf, 1986).

Kim and Lee (2011) investigated the comparative significance of perceived service quality and the relationship between perceived service quality, customer satisfaction, and behavioral purpose using multidimensional methods and concluded that significant proportions of customer satisfaction are substantial, perceptible, and responsive product quality, pricing, and safety. Additionally, the study authenticated the importance and considerable cost of customer satisfaction embracing word-of-mouth communication, purchase intentions, and complaining behavior. The study encourages manufacturers, based on their findings, should expand, or build on tangibles and responsiveness for the enhancement of customer satisfaction and behavioral intentions to boost revenues or earnings to mitigate product costs (Kim, Lee, Joo, & Yuan, 2014).

Harper and Porter (2011) posited that design engineers should constantly watch for opportunities to apply their technical knowledge, skills, abilities, and proficiencies to create better consumer products that meet customer satisfaction. Production of enhanced safety products not only satisfy consumers but has greater propensity for minimizing costs associated with recalls and accidental acts resulting from product defects as a consequence of intentional production or manufacturing of inferior good and services to the consuming public (Krasnikov, Jayachandran, & Kumar, 2009). Skills and technical

approaches used to produce safe products should account for their exceptional output of successful production and positioning of new products to compliment best practices (Kuo, Wu, & Deng, 2009; Wolf, 1986).

Harper and Porter (2011) observed that for many years, U.S has led the product innovation in capital markets in the global environment. U.S. manufacturers operated with great philosophy and placed huge emphasis on pleasing customers. Harper and Porter echoed Tom (1985) findings, which noted that firms have to establish improvement goals of 10 times rather than 10%. To become 10 times faster at one-tenth the cost, companies must look at the situation from new perspectives (Peters, 1985). The key is a constant flow of innovative products, services, and processes that solve customer problems (Drucker, 1986).

Chaudha, Jain, Singh, and Mishra (2011) investigated the constructs of product quality, cost, and customer satisfaction using Kano et al. (2001) constructs. Kano et al. suggested a way to classify different categories of requirements through customers' inputs. Kano et al. produced a model used for analyzing functions that suggested the adjustment of traditional improvement ratio (Tan & Shen, 2000) for each manufactured good attribute in order to recognize its significance that can help develop a product in such fashion that maximum customer satisfaction can be achieved to the fullest of desire. Kano et al.'s model is a theory of product development and customer satisfaction tool developed by Professor Kano in the 1980s that categorized customer needs into five categories: attractive, one-dimensional, must-be, indifferent, and reverse. The model provides awareness of the product qualities perceived as important for customers.

Gosnik and Jujica-Herzog (2010) believed that the most compelling reason companies should be concerned with customer satisfaction is that they need customers to repurchase their goods and services. Orientation toward cooperation with the client currently plays a significant component of effective company management (Gosnik & Jujica-Herzog, 2010).

Best Practices and Models for Influencing Customer Satisfaction

Chaudha, Jain, Singh, and Mishra (2011) greatly commend the use of Kano model for customer satisfaction analysis to find constructs for improving product quality. The reason is that the past 2 decades have seen Kano model become popular among researchers and practitioners (Giebelhausen, Robinson, & Cronin, 2011). Researchers apply the model in strategic philosophy, business forecasting, and product development synthesis to provide guidance with respect to innovation, competitiveness, and product compliance (Lofgren & Witell, 2008). The methodology is illustrated using customer survey data that helps to identify customer needs more specifically and yield maximum customer satisfaction (Chaudha, Jain, Singh, & Mishra, 2011; Fetscherin, & Toncar, 2009); Lalwani & Shavitt, 2013).

In Kano's model, the product designers can understand the need of customers in a better way and can properly focus on it (Tontini, 2003). Products can then be manufactured to satisfy customers' needs by integrating multiple processes, in which all customer needs, product design requirements, process planning, and manufacturing specifications during product development are linked together (Besio & Pronzini, 2010; Tan, 2000).

Synthesizing the above theories helps to enhance consumer satisfaction and loyalty because of the inquisition for high-quality product quality and control that leads to the production of safety products. I found evidence of strengths associated with total quality management concepts (Besio & Pronzini, 2010; Componation, Youngblood, Utley, & Farrington, 2008; Salegna & Fazel, 2011; Tsekeris, 2010; Wolf, 1986).

Total quality management concepts is a theory that encapsulates models and factors robust to improve product safety while minimizing costs, and meeting consumer preferences and satisfaction in the U.S. automobile market (Klefsjo, Bjame, & Rickard, 2008). The reason is quality control (Anderson, Fomell, & Lehmann, 1994) supports inquisitions associated with finding enhanced relationships between product quality, product cost, product safety, and customer satisfaction on good and services in the U.S. automobile market is important (Juran & De Feo, 2010; McLaughlin, 2010; Tsai, 2010).

The theory of total quality management incorporates variety of concepts or models of high-quality products in which all members of an organization contribute toward the improvement of processes, products, services and their environment for a sustained growth (Klefsjo, Bjame, & Rickard, 2008; Raturi & Evans, 2004). Zinn and Haddad (2007) believed that product designers should have more than enormous technical skill in order to succeed in their careers. Experienced industrial engineer can confirm that technical proficiency is only part of the required expertise. One may be able to improve organizational systems, but unless improvement is articulated and communicated to the management and explain its advantage, initiatives will not materialize (Zinn & Haddad, 2007).

Campbell and Frei (2010), Terpstra (2008), and Terpstra, and Verbeeten (2014) argued that product cost should not be used to produce inferior products. In the same lens, Zinn and Haddad (2007) posited that most technical people are receiving training or educational assistance to acquire such skill in social interaction. The few people that receiving training in the institutions are just an exception to the norm (Lalwani & Shavitt, 2013). In nature, people like to do everything themselves and think that completing tasks is faster this way and believe that nobody else has the skill to depend upon (Finn, 2011; Flavio, Filho, & Bonney, 2009).

Filho and Bonney (2009) argued for integrating production control and quality control into management functions because these factors are the most essential tools to improve productivity, minimize costs through time management, and to enhance the quality (Malmi, Järvinen, & Lillrank, 2004; Martinez-Costa & Martinez-Lorente, 2008). Hence, integration of management functions contributes to the increase of average high-quality products, reduce the average value of work in process, minimize average lead-time, and reduce average defect rate (Filho & Bonney, 2009).

The findings confirm the importance of ensuring that product costs should not inflate concepts geared toward the production of unsafe products for consumers (Lalwani & Shavitt, 2013). The consequences are usually huge and may be catastrophic when governmental agencies and consumer watch dogs intervene to encourage products recalls and penalties. Thus, factors for producing high-quality and safe products should not compromise with product costs for short-term gain (Leitner, 2005; Lenert, 2002).

Quality management theories are filled with rich classical inquisitions for product quality management (Deming, 1983; Feigenbaum, 1945, 1961; Feigenbaum & Feigenbaum, 2003, 2009; Gravin, 1987; Hagan, 1984; Ishikawa, 1990; Juran, 1992; Sharma, 1989) and contemporary works on product quality (Chua, 2008; De Feo, 2010, Krivobokova, 2009; Zoia, 2008). The assertions speak to the importance of ensuring that product quality to mitigate safety concerns in the modern society is sustained (Bamber, Sharp, & Hides, 2000; Bingley, 2011; He, 2010; Hill, Zhang & Gilbreath, 2011; Juran, 2010; Raturi & Evans, 2004). These researchers noted the importance of finding enhanced product quality with minimum overhead costs that do not compromise on product safety to assure consumer demands in capitalists markets, which covers car quality and customer satisfaction in the U.S automobile market (Hong & Prybutok, 2008).

He (2010) noted upon additional examination of product quality and safety constructs that high-quality products for satisfying consumer satisfaction echoed (Juran & De Feo, 2010) findings and described quality as a state of fitness. He argued that when quality of consumer products improves, businesses invest more in prevention and consider using enhanced approach systems to boost product safety to mitigate costs associated with loss of revenue acquisitions resulting from product failures. The strategy helps to reduce considerable amounts of waste and revenue losses (Krasnikov, Jayachandran, & Kumar, 2009).

Campbell and Frei (2010) and Terpstra and Verbeeten (2014) submitted that beyond duration of capital investments on product quality improvement systems

noncompliance or systemic defiance of customer feedback and inputs on safety requirements insignificantly reduce costs. Systemic adherence to suggestions motivates total quality costs slightly fall to the optimum cost level, and then rising again as the system continues to operate in optimal levels to enhance company revenue acquisitions (Juran & De Feo, 2010).

Consequently, I argued that enhanced product quality of consumer goods and services are important. New total management procedures encapsulating quality control on product fulfillments should identify and assure product safety for enhance customer satisfaction. The reasoning mirrors Mukhopadhyay (2004), Pande, Neuman, and Cavanagh (2000), and Reitsperger and Daniel (1991) respective studies that argue for enhanced products similar to safe products in Japan.

Campbell and Frei (2010), and Terpstra and Verbeeten (2014) argued that product safety spurs the mitigation of costs and improving product quality enhancing safety to assure customer satisfactions. Björk and Ottosson (2007) agreed with Andreassen (2003) research findings that posited that product development processes are complex, because changes in product quality occur. These attribute to undue cost cutting procedures which unnecessary and negatively affect product safety, customer satisfaction and customer loyalty in the marketplace.

Björk and Ottosson (2007) opined that in traditional research, objectivity and repeatability are essential, but when theories are grounded in science, researchers often influence measuring methods to appraise product safety hence objectivity becomes

difficult to obtain good quality results. In addition, repeatability is even more when humans interfere and where important unplanned and unforeseen events occur.

Research on complex systems is mainly a process of interaction between practice and theory. In the absence of a practical use of theories, researchers will just obtain meager information on how the theories work and how to deviate or adapt the theories in practical application hence due diligence needs to be adopted by incorporating higher safety standard measurements before product fulfillments (Björk & Ottosson, 2007).

Suma and Nair (2008) believed that defect prevention is a process of identifying product defects and their root causes. The practices of applying corrective and preventive measures reduce or eliminate problems that continually produce quality products to enhance customer satisfaction and loyalty. These findings go to the heart of this research investigation to ensure that product management practitioners or management engineers identify defects before fulfillments. The concepts validate two distinct points: the initial time the defect is discoverable and when the defect receives repairs to assure safety compliance. Suma and Nair (2008) expected lackadaisical attitudes toward safety compliance on product defects are more costly if it remains in the product for extended periods. Some or portion of defects can be prevented by training development team and the use of stringent specifications and formal verifications prior to making the product, as well as the use of automation technologies, process and standards, which can be implemented during design, and production and maintenance phases (Hong & Prybutok, 2008). Hence, employment of automation technology reduces defect resulting from interaction problems among employees. Consequently, defect detection methods mitigate

high-volume of losses through review of designs, specifications, schedules, and production records (Suma & Nair, 2008).

Product Quality, Product Safety, and Customer Satisfaction Constructs

Justifying the rationale for the selection of variables and theoretical concepts encapsulates the importance of finding the relationship that exists between product quality and customer satisfaction in the automobile industry of the U.S to promote high-quality passenger cars with less than eight persons. In this research study, I merged constructs of classical and contemporary theories of product quality, quality control, product cost, product safety, and consumer satisfaction to examine the need for enhanced total quality management hypotheses to improve car quality in the U.S. automobile market.

Car quality and customer satisfaction, product cost, and safety are the mediators that being used for examining the hypotheses of product quality (Salegna & Fazel, 2011). Among Feigenbaum (1945, 1991) classical theory on product quality I have identified and extensively linked the constructs for meeting customer satisfaction and customer loyalty to other peer-reviewed articles' findings on product quality, production failures, and customer complaints in support of the need for a positive change (Farris, Neil, Bendle, Pfeife, & Reibstein, 2010; Juran & De Feo, 2010).

Bingley (2011) argued that all processes needed to enhance customer satisfaction and loyalty through product safety is critical to the hypotheses for investigating factors that can be aligned with the objectives, scope and complexity of the organization, and should be designed to add value to the organization. Ranky (2007), Sheffi (2005), Sims

(2011), Sipior (2004), Slotegraaf and Inman (2004), Smith, Hawkins, and Heinemann, (2004) argued for the need to enhance customer satisfactions through the production and fulfillments of product safety in the U.S. market. The benefits of the process approach promote the integration and alignment of processes enable achievement of desired outcomes; provision of confidence to customers (Chun, 2009; Rosenfeld, 2009; Scheere, 2010). Hence, through the lens of Anderson, Fomell, and Lehmann, (1994), Juran and De Feo, (2010), Tsai, (2010), McLaughlin, (2010), and Saleh, (2008), I examined and synthesized customer satisfaction and higher lifetime value with product quality, product cost, product safety, and quality control in the way in which classical and contemporary high-quality product control and total management theorists propose.

The reasons are quality control (Anderson, Fomell, & Lehmann, 1994) supported investigations associated with finding enhanced relationships between product quality, product cost, product safety, and customer satisfaction on goods and services in the U.S automobile market place (Juran & De Feo, 2010; McLaughlin, 2010; Tsai, 2010). Design engineers may use skills set based on the application of enhanced technical knowledge that encapsulates product quality, cost control, and safety to meet customer expectations and satisfaction (Harper & Porter, 2011). The theoretical and conceptual framework of the study outlined and synthesized in this segment of the study support the need to investigate and quantitatively test the relationship of product quality and customer satisfaction (Anderson, Fomell, & Lehmann, 1994; Juran & De Feo, 2010; McLaughlin, 2010; Saleh, 2008; Tsai, 2010).

Summary and Conclusions

I examined the various factors associated with customer satisfaction and higher lifetime value theory (Anderson, Fomell, & Lehmann, 1994). In addition, I examined and synthesized factors associated with product quality theory (Juran & De Feo, 2010), product cost theory (Tsai, 2010), product safety theory (McLaughlin, 2010), and quality control theory (Saleh, 2008) to respond to the various central questions of the study. The method and statistical design examining these factors is discussed in Chapter 3. I examined and analyzed the relationship between car quality and customer satisfaction using product cost and product safety as mediators to identify the best factors that can be established to meet consumer satisfaction of automobils in the U.S. automobile market.

Major themes identified and examined in the literature review include establishing relationships among product quality, product cost, product safety, and customer satisfaction in the U.S. market (Barjaktarovic and Jecmenica, 2011; Boyle & Lathrop, 2008; Cannas and Noordhuizen, 2008; Deming, 1986; Drucker, 1986; Juran, 1995; Juran & Gryna, 1970; McLaughlin, 2010; McManus, 2009; Mies, 2009; Jones & Sasser, 1995; Roubal, 2009). A review of the various peer review articles synthesized in the literature review segment shows classical and contemporary examination of previous studies encompassed the correlation tests between product quality and the use of single dependent variable from each of the following predictors, such as product cost, product safety, or customer satisfaction. Thus, in this study I focused on the use of product cost and product safety to mediate the statistical testing of relationship between product

quality and customer satisfaction (Besio & Pronzini, 2010; Knudsen, 2010; Tsekeris, 2010).

Examination of classical and contemporary peer review articles revealed that enhancement of product quality and assurance of safe product is costly. Previous research findings stipulate to the concerns of increases in production costs passed on to customers in terms of prices of commodities (Farris, Neil, Bendle, Pfeife, & Reibstein, 2010; Wiyaratn, & Watanapa, 2011). Although, literature discuss product quality and market share separately nonetheless, they play important roles in the manufacturing industry and in the markets. Great majority of articles on quality does not link the relationship between product quality costs and customer satisfaction. Most of the research findings propose practical methods for integrating management practices and functional outcomes but do not study the level of influence of product quality on consumers, which are the gap and the central hypothesis for this study (Wiyaratn & Watanapa, 2011). Product quality is the life-support of quality control and it ensures that customer can buy high quality products or services with long-lasting reliability (Chun, 2009; Rosenfeld, 2009; Scheere, 2010).

Chalotra (2012) and Golder, Mitra, and Moorman (2012) posited that product quality is attained by improving total management or production processes to produce uniform output of products, reduce mistakes and rework to assure customer satisfaction and market share. Additionally, minimizing waste of manpower, machine-time, and materials to enhance or boost output with less effort to assure consumers' satisfaction and consumer product loyalty (Aggogeri & Gentili, 2008; Bingley, 2011; Eckert, & Hughes, 2010; Hill, Zhang, & Gilbreath, 2011; Huehn-Brown & Murray, 2010; Juran, 2010).

Consequently, I examined the type of quantitative models and statistical software to identify the population size for data collection to measure and test the various predictors of the study. Chapter 3 includes the research design method pertaining to the research questions, algorithms, and models that appropriate for the production of automobile quality and the level of customer satisfaction.

Chapter 3: Research Method

This research study encapsulated empirically examining the relationship that exists between product quality (automobile vehicles with fewer than eight passengers) and customer satisfaction in the U.S. automobile industry. In this segment, I identify the research method and designs used to measure and analyze the various research questions in the study. Additionally, I present the algorithms and models that are appropriate to the academic and professional community on the production of automobiles and the level of consumer satisfaction on product quality. I outline the various research questions and associated hypotheses used to quantitatively examine and test the relationships between product quality, product cost, and product safety with customer satisfaction.

I provide the theoretical analyses underlying the study. Several theories based on classical theories and contemporary beliefs set the analysis of the problems and hypotheses, tested through statistical research tools. Product quality is difficult to assess because quality is intangible. It is not feasible to develop well-defined quality standards that will enable the producer to have complete control and rejection of defective products prior to reaching the consumers (Krivobokova, 2009).

Customer satisfaction is commonly misconceived as based on the stated standards or the recruitment of certain objective characteristics of products and not with the quality conceived by the consumer (Krivobokova, 2009). Therefore, in this chapter, I present discussions of the type of statistical research design and rationale for its usage. The statistical methods involve measurements of automobile product-based quality that might influence the level of user-based customer satisfaction with intervening safety-based

mediator and cost-based mediator. I outline the various research questions and hypotheses to examine and test product quality and other product attributes in the study.

Through the lens of Rodchua (2009) research prism, I selected the target sample size from a population of $N = 77$, similar to that of the ACSI approach on the number of participating consumers of automobile users. In the areas of instrumentation measures and constructs of this study, I adopted the previously validated instruments in the work of Debra (2005), as well as other contemporary literature to minimize the potential measurement error. By so doing, I used enhanced data analysis techniques including simple linear regression (SLR) and multiple linear regression (MLR) analyses to find the results in Chapter 4 of this study.

Research Design and Rationale

The use of an appropriate research design was based on the objective and approach of this study and the evaluation of the strengths and weaknesses of each method. A mixed method was not used because it requires excessive time and resources in collecting, combining, and analyzing data and research materials with use of both quantitative and qualitative approaches. A mixed methods approach would be difficult to use for a novice researcher, as it requires training in quantitative, qualitative, and mixed-methods approaches. The qualitative method was not used because it works well for small numbers of participants, but the procedure and data collection are labor-intensive and expensive to accomplish (Creswell, 2006). This method has a tendency to lead the study toward research bias and a lack of generalizability of its findings.

The experimental design was not applicable because of the nature of its process for planning a study to meet specified objectives. Planning an experiment properly is difficult in ensuring that the right type of data and a sufficient sample size and power are available to answer the research questions of interest as clearly and efficiently as possible. Experimental designs work well for studies involving groups that separate or teste individually in a given time. Quasi-experimental research shares similarities with the traditional experimental design or randomized controlled trial, but they lack the element of random assignment to treatment or control (Creswell, 2006).

The quantitative method using a survey design was chosen for this study. The purpose of this quantitative methodology was to determine the relationship between product quality and customer satisfaction. Quantitative research is the systematic empirical investigation of observable phenomena via statistical, mathematical, numerical data, or computational techniques. The objective of quantitative research is to develop and employ mathematical models, theories, and/or hypotheses pertaining to phenomena. The process of measurement is central to quantitative research because it provides the fundamental connection between empirical observation and mathematical expression of quantitative relationships. Quantitative data are any data that are in numerical form, such as statistics, or percentages. This means that the quantitative researcher asks a specific, narrow question and collects a sample of numerical data from observable phenomena or from study participants to answer the question. The researcher is hoping the numbers will yield an unbiased result that can be generalized to some larger population (Creswell, 2006).

I used a quantitative cross-sectional survey research design with multiple regression statistical models to examine and analyze the data to assure validity and generalization (Field, 2009; Frankfort-Nachmias & Nachmias, 2008). The design provides the opportunity for a statistical modeling for the measurement of automobile product-based quality. The choice of design helps to identify and use robust statistical models whose result has the capacity to influence levels of user-based customer satisfaction with intervening safety-based mediator and cost-based mediator.

I used the data from the measurements to determine if there are correlations among the automobile attributes such as product quality, product cost, product safety, and customer satisfaction. I present customer satisfaction (CS), the DV to define the parameter of product quality (PQ), the IV. Product safety and product cost were used to mediate (M) the possible relationship between the product quality and the customer satisfaction.

The design choice was consistent with the research design because, in order to determine the possible correlations between the IV and the DVs, a quantitative, nonexperimental research design was used to measure the data to ascertain the results. The research design consisted of plans and the formulations of the study of hypotheses, including the decision to use the appropriate design methods, instrumentation, measurement of variables, and collection and analysis of data (Creswell, 2003, 2006, 2009).

I conducted an analysis of the theories to confirm, refute, or define the internal validity of the study. The hypotheses explain a phenomenon or predict the results of an

action (Frankfort-Nachmias & Nachmias, 2008), whereas, in the quantitative, nonexperimental research study, I used the mediation regression analysis to determine if there were correlations among the product quality, product cost, and product safety to the consumer satisfaction.

I used a multiple regression statistical process in the analysis to measure automobile quality according to the product-based definition and to determine if there are correlations among product quality, product cost, product safety, and customer satisfaction. In the quantitative method, the use of approach in collecting data is relatively easy if an existing or survey research data is used.

I accessed the data through electronic communication device namely, SurveyMonkey, and used a cross-sectional design. Once data were collected from the respondents, the trends afterwards were analyzed. The large random samples provided the best selection of data used in the analysis. A quantitative design method allows researchers to control IVs, which determines their effects on the DV. The experimental design approach enables researchers to manage the extrinsic variables properly, which can strengthen the internal validity of the study.

The design reflected the procedure identified the results of Cronbach's Alpha tests, and previous findings from regression analyses. The use of this design allows for the manipulation of the IVs in order to observe its effect on behavior or the DV. It allows for the manipulation and randomization of assignment of participants to groups in order to control external factors from influencing the results (Campbell & Stanley, 1963). The design approach is one of the most accurate forms of research because the technique

provides the researcher the ability to use enhanced statistical methods that yield robust results to support or reject the various hypotheses of the research questions. In statistical analysis, any information gathering exercises where variation is presently for testing hypotheses (Kalla, 2009). Additionally, the rationale for the chosen research design allows the researcher to maximize systematic variance, as well as control the extraneous and error variance, the threats to validity, and the degree of confidence. The quantitative design provides the ability for researchers to infer causal relationships because of high internal validity (Frankfort-Nachmias & Nachmias, 2008). The data from both methods of collection, several pilot tests will be required before conducting the actual multiple linear regression analysis.

Research Methodology

I used quantitative techniques of cross-sectional survey research design with multiple regression and a statistical meditation models to examine and distinguish the relationship between product quality (car quality) and customer satisfaction using product cost and product safety as mediators' relationships of variables in the study. The research design approach that I have outlined required the use of vast information and research data from the Internet.

I used SurveyMonkey as the Internet medium tool to extract data because the past decade has seen a tremendous increase in Internet use and computer-mediated communication (Ahern, 2005). Contemporary studies show that surveys using software packages and website survey services make online research much easier and faster. Researchers in different disciplines take advantage of the enhanced features associated

with conducting surveys through e-mail or Internet, which are faster to conduct than telephone interview (Frankfort-Nachmias & Nachmias, 2008).

Therefore, I used Internet inquiry systems to access individuals in distant locations. The method greatly reduces researcher time and effort, and benefit from the convenience of automated data collection process. Besides, an online research method minimizes the ambiguity or improbability more than the validity of the data and sampling subjects, and apprehensions adjoining the design, and evaluation process of survey methods use in the study (Wright, 2005).

Researchers find the Internet as rich domain for conducting survey research. This is because thousands of groups and organizations have moved online and many of them aggressively promoting their presence with search engines, email lists, and advertisements. Organizations not only offer information to the consumers, but also present opportunities for researchers to access a variety of populations affiliated with these groups. Without the use of the Internet, many research studies would be difficult to accomplish (Ahern, 2005).

Cross-sectional survey research design was appropriate because the method helps save time and financial resources when obtaining research data for analysis. The method avoids lengthy and expensive process of collecting data through survey, which requires the time-consuming delivery and receipt and collation of responses. The methodology and survey methods discussed include the observations of obtaining informed consent of participants in the research because it entails human subjects to assure strict compliance and meet existing stringent ethical standards for scholar practitioners.

Population

SurveyMonkey Internet Services was used to gather $N = 77$ randomly selected U.S. automobile users. I used SPSS statistical package to analyze the target population. The size of the population relies on the number of randomly selected participating consumers of automobile vehicles in the U.S. as large data (Rodchua, 2009).

Using G*Power software (Erdfelder, Buchner, Faul, & Lang, 2007), I have identified the population size is $N = 77$, and construed as the participants which is in support of the concept for using large data to validate research results (Rodchua, 2009). The reason for the target population is because research have found that a reduction of the number of sample units from a large population helps simplify the statistical process, mathematical procedure, and lower the costs of the study (Frankfort-Nachmias & Nachmias, 2008).

Sampling and Sampling Procedures

I identified the target population sample size of N = 77 from randomly selected U.S. automobile consumers to be analyzed in the study. There are several types of sampling designs available for researchers—including simple random sampling method, probability and non-probability samples, convenience samples, purposive samples, quota samples, stratified samples, and cluster samples (Frankfort-Nachmias & Nachmias, 2008). These types of designs provide several ways for simplifying the selection of sample units or means of reducing the number of sample units from the target population. Thus, I find systematic sampling approach as much convenient because it is more appropriate for the research project (Cochran, 1977; Field 2009).

I identified systematic sampling design and strategies that mirror Creswell (2009) and Frankfort-Nachmias and Nachmias (2008) research findings, which provide researchers, enhanced strategic procedures to validate and generalize results of the study. A systematic sampling design was the best-fitted quantitative research project to determinate if there is a relationship between each predictor [or combination thereof] and the outcome variable—where the predictors are: the quality product, the product cost, and the product safety because the outcome variable is the customer satisfaction.

A systematic sampling strategy helped resolve the issue confronting the population of people, as well as the processes by which particular people (or groups) feel particular ways and the role they play in dynamic processes within the society. The reason is Systematic sampling strategy identifies an individual or group of people under study as to where that individual is located within a group (Creswell, 2003, 2006, 2009). Other forms of sampling strategies construe people as essentially interchangeable and treat always as equal. Hence, a systematic sampling is far better than any randomly chosen sample (Frankfort-Nachmias & Nachmias, 2008).

A systematic sampling is particularly useful in the context of evaluation research and policy analysis because it involves the identity of major stakeholders in the study. The advantages for using systematic sampling relates to the amount cost involved. The cost associated with this type of technique is very low, ease of data collection. The process allows homogeneity to develop the accuracy and quality of the data because the data is smaller (Barjaktarovic & Jecmenica, 2011). I selected the approach because systematic sampling techniques (Frankfort-Nachmias & Nachmias, 2008) provided ways

of simplifying the selection of sample units or means of reducing the number of sample units from the target population.

The sampling frame techniques used mirror that of Debra (2005), who examined several consumers in retrospect in the determining possible effect of quality on consumers; that is, either satisfied or unsatisfied. Debra conceptualized the notion of consumer disposition toward satisfaction (CDS) and defined CDS as the consumer's general tendency (Debra, 2005). The strategy found in the findings sufficiently satisfies the acquisition and consumption of goods and services in the market place. CDS scale encompasses developed theoretical measurement scale for to address validity problems (Debra, 2005; Harper & Porter, 2011).

The sampling frame involved strategic scale development process (Debra, 2005). Three-stage procedure technique covering entry generation, scale purification, and scale validation which is comprised of 11 separate data collections, involving the $N = 77$ randomly selected target population survey participants for analysis. I exercised maximum care undertaken to ensure that the sampling frame supply proof or support for face, content, criterion-related, discriminant and convergent validity, dimensionality, reliability and generalizability of the CDS scale (Debra, 2005). CDS scale is a one-dimensional, sparing scale that has the potential beneficial usage in developing and testing the theory (Barjaktarovic & Jecmenica, 2011; Baron, & Kenny, 1986; Cochran, 1977; Debra, 2005).

Being that systematic sampling allows for the opportunity for researchers to arrange the target population in a study (Frankfort-Nachmias & Nachmias, 2008), I used

the procedure to effect organized start and advance the range of every k^{th} element from then onwards (Debra, 2005) to analyze the data in the sampling frame. The use of systematic sampling will enable the selection of every given equal interval (k^{th}) from the population in lieu of selecting the sample units from the complex list of random numbers (Frankfort-Nachmias & Nachmias, 2008).

In order to draw the sample units from the population, the sampling interval, k^{th} = N/n = 77 / 7 = 11 rounded was determined first. With the 11-sampling interval that resulted from the calculation, I selected the 7th person from the list of population as the first sample unit, followed by the 14th, then the 21st, and so on, until the 77th sample unit. This form of sampling technique provides the ability for researchers provide survey participants with questionnaires for analysis to respond to the central question of the study.

I used G*Power software version 3.1.9.2 (Erdfelder, Faul, & Buchner, 1996; Erdfelder, Buchner, Faul, & Lang, 2007) to conduct power analysis to verify the most appropriate sample size for the study to examine the relationship between car quality and customer satisfaction using product cost and product safety as mediators. Field (2009) posits that population samples calculated by using the Cochran's equation are applicable to the continuous data and it is a reliable model for use by social scientists.

G*Power software contain robust constructs that allows for the estimation of sample and effect size so that simple linear (SLR) regression statistical methods can be used to effectively analyze sample size or data to validate results (Erdfelder et al., 1996, 2007). The reason is linear regression is a multifaceted statistical tool that necessitates

primary data to conclude or establish any odds ratio and ensures the sample size for the study is correct or reliable depends upon the number of continuous variables used.

Figure 1 shows the result of G*Power software package (Erdfelder et al., 1996, 2007) sample size power analysis based on Cochran's formula for continuous and discrete variables (Bartlett, Kottlik, & Higgins, 2001). The estimations resulted $N = 77$ sample size for the study.

Using a G*Power statistical test of linear multiple regression random effect regression power analysis software Bonferroni (1935, 1936), I computed the exact or required sample size based on confidence interval estimations. G*Power provided N = 69 sample size at 1-tail and $N = 77$ at 2-tail. I modified the alpha from .05 levels to .01 for Bonferroni correction, power of .80, and random model regression with 3 IVs. Bonferroni correction helps to statistical multiple-regression comparison technique used to test several dependent or independent values when a given alpha "α" is suitable for every particularized comparison. Consequently, to be conservative, I have chosen the G*Power random effect sample size of $N = 77$, 2-tail, α err prob = .01, and power (1-β err probability and confidence level) = .80.

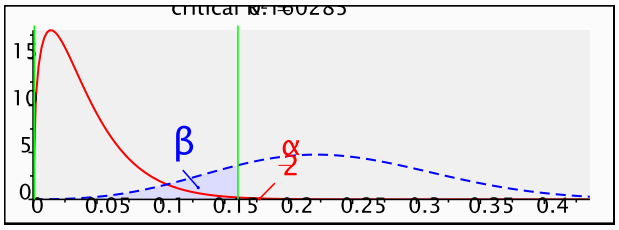

Figure 1. G*Power plot sample analysis.

Table 1 is the power analysis result for the sample size that yielded $N = 77$ randomly selected sample size for three predictor variables for the study. During the G*Power computation, I set the alpha level priori at 0.01 for Bonferroni error correction and alpha 0.80 confidence level to assure reliability and generalizability of the results. The procedure helps to ascertain good sample size (Field, 2009).

Table 1

*G*Power Compute, Sample Size Power Analysis Distribution Table*

Linear Multiple Regress: Random Effect Model

Exact Distribution:
A priori: Compute required sample size

Input:						Output:			
Tails	H1 p^2	H0 p^2	α err prob	Power (1-β err prob)	Number of predictors	Lower Critical R^2	Upper Critical R^2	Total sample size	Actual power
0.2054	0.5	0.8	3	12	2.8165	3	44	77	0.804397

Procedures for Recruitment, Participation, and Data Collection

I used SurveyMonkey to collect data for analysis in this study. As SurveyMonkey survey procedures were in line with University IRB procedures, I ensured that participants freely selected to partake or contribute in the signing of electronic consent forms. The consent form was simply marked whether the participant freely agree or disagree to partake in the survey electronically. Participants who voluntarily agreed to partake in the survey were 18 years of age at the minimum. Participants were restricted to

licensed automobile drivers within U.S. These strategies were consistent with existing practices and lauded by many researchers (Jiang, Lockee, & Bass, 2008).

Contributing members consisted of varied collection of individual consumers who were willing to share their opinions without malice or prejudice about good and services in the U.S. market place. My SurveyMonkey contributing member database consisted of voluntary individual U.S. consumers who met the demographic targeting criteria of automobile users of eight (8) or fewer passenger vehicle drivers in the U.S. automobile market.

I provided participants with privacy statements, which included exhaustive and comprehensive privacy statement to answer, and for them to understand data collection methods, data use, and protection to assure maximum personal information (Cochran, 1977; Creswell, 2003; Frankfort-Nachmias & Nachmias, 2008). Survey procedures entailed standard template email notification sent electronically to inform respondents of the survey by e-mail. Linkage to the survey allowed random group of participants to access the template on SurveyMonkey's website database to log and protect survey responses.

The duration of SurveyMonkey's turnaround was approximately 30-days. However, with all time constraints to address unforeseen circumstances I anticipated 60 days of satisfactory data collection period before analysis begins. Data collection strategies included avoidance of lengthy questionnaires. Characteristically, simple and short surveys achieve better, consequential, and perceptive or astute responses to enhance survey results (Kennedy, 2003; Frankfort-Nachmias & Nachmias, 2008). I assessed the

data from the survey from SurveyMonkey and used them to test the hypotheses. Collection procedures generated a list of potential data on consumers. Collection procedures generated a list of potential data on automobile consumers (Cochran, 1977; Creswell, 2003; Frankfort-Nachmias & Nachmias, 2008).

Similar to Debra's (2005) approach, this project methodology required each participant to provide his or her views of the term *customer satisfaction* given the factors such as product quality, product cost, and product safety. These represent parameters such as items encapsulating expectations, items relating to desires and wants, items in relation to performance, items relating to feelings, items relating to value, and items relating to satisfaction with the use of a 7-point Likert Scale ranging from *strongly disagree* to *strongly agree*.

The size of the population based on the number of participating consumers of automobile users in the U.S. The method encapsulates $N = 77$ randomly selected participants from the target population for the study which is considered large data (Rodchua, 2009). The reduction of the number of sample units from a large population helps simplify the statistical process and mathematical procedure and lower the costs of the study, as well (Frankfort-Nachmias & Nachmias, 2008).

As previously described, similar to Debra (2005) approach, each participant shared their views on the term *customer satisfaction* given the factors such as product quality, product cost, and product safety. The strategy reflects such parameters as items encapsulating expectations, items relating to desires and wants, items in relation to performance, items relating to feelings, items relating to value, and items relating to

satisfaction with the use of a 7-point Likert Scale ranging from *strongly disagree* to *strongly agree.* There was a pilot study using approximately five of the participants from the total sample pool.

Pilot Study

A pilot study is a small experiment to gather data and test and logistics of the data analysis procedures prior to the larger study being conducted. Pilot studies generally conducted improved the efficiency and quality of the study. While doing so, the pilot study may reveal drawbacks or deficiencies in the procedures, which can be addressed by allocating additional resources and time towards the larger scale study. Seidman (2006) indicated that all interviewing researchers should include a pilot test to assess their surveying design with a small number of participants. The content and procedures of a pilot study should address the following questions:

1. Are the instructions clear and easy to understand?
2. If not, what should be changed?
3. Are the questions clear and easy to understand?
4. If not, what should be changed?
5. Do the questions cover the topic?
6. If not, what questions should be asked? Should any be changed or deleted?

I used a pilot study to assess the appropriateness of the instruments and the data analysis procedures. The basic rationale for a pilot study is to assess whether the questionnaire and research instruments are appropriate for gathering the data. For example, a participant might interpret a question incorrectly, meaning a rewording might

be necessary. Once the methods of the research designs and approach were validated, then the actual study was conducted. The results of the data from the pilot study will remain separate from the findings of the full data set.

Instrumentation and Operationalization of Constructs

For the measure, this study adapted the previously validated instruments in the work of Debra (2005), as well as the existing literature in order to minimize the potential measurement error. As previously, discussed SurveyMonkey Internet service used to conduct an Internet survey. The survey was administered to N= 77 target population of automobile acquisition consumers from the randomly selected population of U.S. automobile users. All responses were kept anonymous. However, some demographic data collected determined the nature of the sample. The completion of the questionnaire will be voluntary, and no remunerations or inducements were offered to the contributors or participants for completing the survey. The survey was included Appendix B.

In order to conduct regression analysis for this study, each entry on the Likert scale was rated at 10 intervals. For instance, strongly disagree will be 1 to 10; agree will be 11 to 20; and so forth. Likert scaling method, if manifested by assigning values, would be appropriate for this project to relate product quality cost and market share in a manufacturing environment (He, 2010).

In terms of the applications of researcher instruments, a Likert scale is concerned with the theory and technique which immediate goal is to understand individuals and groups by both establishing researching specific cases as in the study of the effect of product quality associated with customer satisfaction on automobiles in the U.S

marketplace. This project included the measurement of knowledge, abilities, attitudes, personality traits, and survey and analysis of data such as scores obtained from assessments to infer the abilities of customers.

This project also necessitated two main research tasks such as the creation of mechanism and measures for quantification, the expansion or advancement, and enhancement of theoretical approaches to measurement (Cochran, 1977; Creswell, 2003; Frankfort-Nachmias & Nachmias, 2008). Likert scale is one of the primarily used methods to scale responses in survey research needed to correlate two variables.

In this project research study, the customer satisfaction surveys used numerical scales in order to measure customer satisfaction levels (He, 2010). Subjects received guidelines to select from seven Likert scales that represent a score on their level of satisfaction. A scale that runs from one to seven, where one indicates total dissatisfaction and seven for total satisfaction. Thus, the range captured the intensity of respondents' feelings for a given item, while the results of the analysis of multiple items (if the items are appropriate) reveal a pattern that contained the scaled properties (He, 2010; Frankfort-Nachmias & Nachmias, 2008). From the collection and compilation of responses, I measured the final score for each participant by totaling the values of all items selected by the participants. I used the values represented by numbers as data to perform the statistic operation to determine the possible relationships of variables, or phenomena. The scores between 5 and 7 are *the corridor of satisfaction*. Additionally, Figure 3 is the corridor of customer satisfaction. The figure shows an example of checklist rating card for customer satisfaction responses that used as a backup or an

additional tool in the survey. I combined the resulting data from the two sets of questionnaire to ensure wide coverage of car users as others may not be comfortable in responding to questions on a Likert Scale.

Operational Definitions of Terms

I used the terms below in the research study. I have outlined the various terms with their corresponding quantitative definitions for the research study as noted in Harper and Porter (2011); Juran and De Feo (2010); McLaughlin (2010); and Tsai (2010) articles.

Covariate Analysis and Homogeneity of Regression: homogeneity of regression assumes that the slope or steepness of the regression between a dependent variable and the covariate is equal for each level or group of the independent variable. The relationship between the dependent variable and the culvert should be the same for each level or group of the independent variable. Violation of this assumption signifies that there is a significant interaction between covariate and the independent variable on the dependent variable. If there is heterogeneity of regression, using a particular covariate analysis cannot be use (Green & Salkind, 2011).

Effect of Normality in ANOVA: Normality refers to a distribution of scores where the mean equals the median equals the mode. It is a bell-shaped curve. Most inferential statistics have an assumption of normality of variables. When a variable is normally distributed, it means it is not skewed. However, in order to modify nonnormal variables, some of the parametric statistics for independent *t*-test and one way repeated ANOVA,

there is a nonparametric equivalent usable to deal with nonnormal variable (Frankfort-Nachmias & Nachmias, 2008).

Multicollinearity: Multicollinearity occurs when variables are too highly correlated with each other, greater than the absolute value of .8. Multicollinearity can increase the error in analysis and weaken that analysis. In some cases, if the multicollinearity is very high, finding the right solution for the analysis is not possible. To fix multicollinearity, delete any of the variable pairs or just one of those variables that are too highly correlated. The approach is very conservative, but it can help either run bivariate correlations, Pearson or point bi-serial methods, depending on the scale of measurement of variables. If any of those correlations are greater than the absolute value of .8, multicollinearity exists in the analysis (Green & Salkind, 2011).

Models of Moderation: As posited in Muller, Judd, and Yzerbyt (2005) a fundamental model that underlies moderation represents the measurement error of each regression equation. Mediation of the relationship between the independent variable (*X*) and the dependent variable (*Y*), also called the overall treatment effect is shown in paths *A*, *B*, and *C* on the diagram (Muller, Judd, & Yzerbyt, 2005).

Hence, I employed mediation analyses in order to determine if the independent variable, product quality (X) can influence and other variables (Y) such as, cost, safety, and customer satisfaction. Physical flow of relations between attributes of the variables examined with the following steps and equations to determine if the moderator is usedful or not in testing the hypotheses of the study (Baron & Kenny, 1986).

R-squared Test (R^2): good-to-fitness accuracy of the model determined by the result of R^2 testing. R^2 provides a good measurement of the substantive size of the relationship. The variable allows for statistical testing which measures the adequacy of the model as presented in the following equation:

$R^2 = SS_M / SS_T$

Where:

R^2 = coefficient of determination

SS_M = outcome explained by the model sum of squares

SS_T = sum of squared differences of the observed deviations

Statistical F- test: F-test is a method of making decisions using data from a study, which has an *F*-distribution under the null hypotheses. The method helps to compare statistical models fitted to a data set in order to identify the model that best fits the groups from which the data were sampled (Fisher, 1920). The statistical results indicate whether the *F* ratio is significant or not. All versions of ANOVA follow these basic principles, but the sources of variation get more complex as the number of groups and the interaction effects increase (Green et al., 2011).

I repeated Step 3 above to determine the significant role of the other mediator, the product safety. If the relationship in Step 3 was significant when the mediator and the independent variable used simultaneously to predict the dependent variable, the previously significant path between the product quality and customer satisfaction greatly reduced. In other words, if mediators were to be removed from the relationship, the relationship between the independent and dependent variables would be noticeably

enhanced. The above steps illustrated the relationships among variables and moderator; however, the actual calculations accomplished with the use of SPSS software.

Data Analysis Plan

Using SPSS 22.0 software, I used simple linear regression and multiple linear regression analyses, which to analyzed the data (Field, 2009). The reason is SPSS provides robust quantitative models and applications acceptable for conducting complex statistical methodology (Field, 2009). I properly executed each step of the estimations and analysis to produce valid results. SPSS software provided variety of statistical tools necessary to determine the dependability of the data for testing the hypotheses to respond to the central questions in the study.

In respect to data, cleaning in preparation for conducting inferential statistics I examined the data to minimize or eradicate outlier of variables. Outliers in variables were scores in the variables that are extreme in value, either greatly higher or lower than all the other scores for that variable (Morrow, 2011). Outliers are any values that have standardized scores in excess of the absolute value of 3.29, which was either positive or negative 3.29 for that variable, which can lead to both type 1 and type 2 errors, thereby making the solution unreliable. Therefore, I searched for outliers by way of creating standardized scores, z-scores for all of the variables. After creating standardized scores, frequencies I determined from the new standardized scores if any variables with values in excess of the absolute value of 3.29 were present so that I delete them from the variables (Field, 2009).

For the adopted theoretical technique, I employed strategies similar to Debra (2005), who examined several consumers in retrospect in the determining possible effect of quality on consumers; that is, either satisfied or unsatisfied (He, 2010). Debra conceptualized the notion of "consumer disposition toward satisfaction" (CDS) and defined CDS as the consumer's general tendency to be sufficiently satisfied with the purchase and consumption of the goods and services (He, 2010). Debra (2005) developed and proposed CDS Scale that embodied a theoretical measurement scale address validity issues in survey analysis, which will be adhered in this study.

Three stage development processes was involved to measure the data covering the evidence for face, content, criterion-related, discriminant and convergent validity, dimensionality, reliability and generalizability of the CDS Scale (He, 2010). Debra (2005) CDS Scale is a one-dimensional; sparing scale that has the potential beneficial usage in developing and testing the theory (He, 2010). Using prototype espouse use by Debra (2005) the below procedures accompanied by parameters such as items encapsulating expectations, items relating to desires and wants, items in relation to performance, items relating to feelings, items relating to value, and items relating to satisfaction with the use of a 7-point Likert Scale ranging from *strongly disagree* to *strongly agree*. Based on Debra (2005) I will use multiple regression techniques outlined in the below steps to analyze data:

Step 1: Using a simple linear regression analysis, I statistically, regressed the dependent variable on the independent variable to determine if there was a significant relationship between them.

Product quality (IV) and customer satisfaction (DV) equation:

$$Y_1 = \beta_1 + \beta_2 X + \epsilon_1 \quad (1)$$

Where:

Y_1 = outcome variable customer satisfaction as influenced by the independent variable

X = independent variable, product quality

β_1 = Y intercept

β_2 = X intercept (must be significant)

ϵ_1 = model of fit error between IV and DV

Step 2: Using a simple linear regression analysis, regress the mediator on the independent variable to determine if there is a significant relationship between them by way of path *A 3*.

$$M_e = \beta_3 + \beta_4 X + \epsilon_2 \quad (2)$$

Where:

M_e = Effect on mediator by the independent variable

X = independent variable, product quality

β_3 = Mediator intercept

β_4 = X intercept (must be significant)

ϵ_2 = model of fit error between IV and mediator

Step 3:

Using a multiple regression analysis: regress the dependent variable on the mediator and independent variable to determine if the mediator was a significant predictor of the dependent variable, while controlling for the independent variable

$$Y_2 = \beta_5 + \beta_6 X + \beta M_e + \epsilon_3 \quad (3)$$

Where:

Y_2 = outcome variable customer satisfaction as influenced by both the mediator and independent variable

X = independent variable, product quality

M_e = Effect on mediator [product cost] by the independent and dependent variables

β_5 = Y intercept

β_6 = X intercept (must be significant)

β_7 = X intercept (must be significant)

ϵ_3 = model of fit error among moderator, IV, and DV

In a one-way or single-factor ANOVA analysis, for example, statistical significance tested by comparing the F-test statistic as follows:

$$F = \frac{\textit{Variance between treatments}}{\textit{Variance within treatments}} \quad (4)$$

$$F = \frac{MS_{Treatments}}{MS_{Error}} = \frac{SS_{Treatments} / (I - 1)}{SS_{Error} / (n_T - 1)}$$

Where, MS = mean square, I = number of treatments and n_T= total number of cases to the F-distribution where I- 1, $n_T - 1$degrees of freedom. Using the F-distribution

was necessary, because the test statistic is the ratio of two scaled sums of squares, each of which follows a scaled chi-square distribution (Gelman, 2008). Critical value of F is a function of the numerator degrees of freedom, the denominator degrees of freedom, and the significance level (α). If $F \geq F_{\text{Critical}}$ (Numerator DF, Denominator DF, α) then reject the null hypothesis (Green et al., 2011; Howell, 2002; Hueiju Yu, & Fang, 2009). I employed the test of hypotheses with Simple Regression and Multiple Regression with the help of SPSS/PASW statistics software package.

Quality cost is a standard of quality performance, but only if valid comparisons exist between variables and different sets of cost data (Green et al., 2011; He, 2010). Overall, the cost quality is the total of the cost incurred for quality control process and the reduction or elimination of product harmful effect to capture a strong market share. This research on quality is partly focusing on He (2010) competent analysis of the quality cost in order to determine the best way to minimize the quality production cost and the overall savings from increased in market share. In TQM system, the quality controls happen on all levels (He, 2010).

The use of Pearson correlations was also appropriate for this analysis, because the predictors' product quality, product cost, product safety, and outcome variable customer satisfaction are continuous variables. Once correlations were established, the hypotheses were further tested with use of mediation regression analysis and the multiple regression analysis. The various hypotheses in the study helped toward answering the research question. Where the predictor was product quality and the outcome variable is customer satisfaction. Alternatively, I used product cost and product safety as the mediator in the

attempt to find a significant correlation between independent and dependent variables. In the test of hypotheses, I employed a multiple regression with the help of SPSS/PASW statistics software package (Field, 2009).

Quality cost is a standard of quality performance, but only if valid comparisons exist between variables and different sets of cost data. Overall, the cost quality was the total of the cost incurred for quality control process and the reduction or elimination of product harmful effect to capture a strong market share. This research on quality rely on competent analysis of the quality cost in order to determine the best way to minimize the quality production cost and the overall savings from increased in market share. In TQM system, the quality controls happen on all levels.

The research design approach benefited with the use of vast information and research data from the Internet. The past decade has seen a tremendous increase in Internet use and computer-mediated communication (Ahern, 2005). Today's survey using software packages and website survey services makes online research much easier and faster (Harter, 1999). Many researchers in different disciplines now take advantage of the features associated with conducting surveys through E-mail or Internet, which are faster to conduct than telephone interview (Frankfort-Nachmias & Nachmias, 2008). Internet inquiry allows me to access individuals in distant locations, reduce researcher time and effort, and benefit from the convenience of automated data collection process. Besides, an online research minimizes the uncertainty over the validity of the data and sampling issues, and concerns surrounding the design, and evaluation process of a survey (Wright, 2005).

Researchers may find the Internet as a rich domain for conducting survey research (Ahern, 2005). Thousands of groups and organizations have moved online and many of them aggressively promoting their presence with search engines, email lists, and advertisements. These organizations not only offer information to the consumers, but also present opportunities for researchers to access variety of populations affiliated with these groups. Without the use of Internet many research work would be difficult to accomplish.

I employed the method of obtaining research data, because it saves time and financial resources. The technique helped to avoid the lengthy and expensive process of collecting data through survey, which requires the time-consuming delivery and receipt and collation of responses (Harter, 1999). The strategy eliminated the needs to obtain permission, as the data are public domain. Unlike the survey method and field observation, the use of existing research does not involve a human subject, which requires strict compliance with the stringent ethical standards.

I used cross sectional research design and multiple regression statistical methods to measure automobile safety quality according to the product based definition to determine if there were correlations among product quality, product cost, product safety, and customer satisfaction. In quantitative method, the use of approach in collecting data is relatively easy if an existing research data exist. I accessed the data through electronic communication devices. Large random samples provide the best selection of data to in quantitative analysis. Quantitative cross sectional survey design methods allow researchers to control independent variables to determine effects on the dependent

variable. In other words, the experimental design approach enables researchers to manage the extrinsic variables, which can strengthen the internal validity of the study.

This cross-sectional research design proposal uses the procedure and results of Cronbach's Alpha tests and previous findings from regression analyses. The use of this specific design allows researcher to manipulate the independent variable(s) in order to observe its effect on behavior or the dependent variable. It allows manipulation and randomization of assignment of participants to groups in order to control external factors from influencing the results (Campbell & Stanley, 1963). The design approach is the most accurate form of research, in that it tries to prove or disprove a hypothesis with use of statistical analysis. Kalla (2009) argued that in statistical analysis, any information-gathering exercises where variation is present for testing hypotheses (Kalla, 2009). It allows the researcher to maximize systematic variance, as well as control the extraneous and error variance, the threats to validity, and the degree of confidence. It also helps researchers in inferring measurable causal relationships, because of high internal validity (Frankfort-Nachmias & Nachmias, 2008). The data from both methods of collection, several pilot tests will be required before conducting the actual multiple linear regression analysis.

Baron and Kenny (1986) and, Preacher and Hayes (2004) suggested that mediation statistics provides the ability for researchers to quantitatively estimate direct and indirect effects of mediator variables to reliably uncover the relationship between two variables. Hence, variables construed as mediators based on the extent of their control or power in

the relationship among criterion variable(s) and predictor variable(s) (James & Brett, 1984).

Consequently, Jude and Kenny (1981) proposed three mediation regression statistical techniques to test mediation variables to assure reliability and generalizability of the results because mediator variables can be hypothesized to control the relationship or association-involving criterion and predictor variables. For an effective mediation analysis, Baron and Kenny (1986) and Preacher and Hayes (2004) provided the below examples of independent regression statistic equations for social science research inquiries:

$$Y = \beta_1 + cX + e_1 \quad (1)$$

$$M = \beta_2 + aX + e_2 \quad (2)$$

$$Y = \beta_3 + c'X + bM + e_3 \quad (3)$$

Where,

Y = dependent or criterion variable

X = independent or predictor variable

M = mediator variable

β = the intercepts

e = model fit errors

a, b, c and *c'* = this represents the various regression coefficients that I will use for the various dependent, independent, and mediator variables in the study.

Consequently, during the estimations of each of the correlation coefficients of the variables, I ensured that the predictors could significantly forecast the criterion variables

used in *equation 1* such that any linear correlation among the dependent and independent variables captured, thus, $c \neq 0$). Additionally, I ensured that linear relationship with the independent and mediator variables to mirror equation: $a \neq 0$) for *equation 2*. Finally, I ensured that linear link existed among the criterion and mediator variables to mirror equation: $b \neq 0$). This is necessary so that all of the mediators can significantly forecast or estimate the coefficient of determination, R^2 and regression coefficient, (the criterion variables) in *equation 3*.

Hence, I applied the below factors in the study. Thus,

X = Product quality (PQ) (independent variable or predictor)

Y = Customer satisfaction (CS) (dependent variable or criterion)

M = Product cost (PC) and Product safety (PS) (mediator variables)

Consequently, I employed mediation statistics methods where,

1. Product quality (PQ) the independent variable or predictor significantly influence or associate with Customer satisfaction (CS) the dependent variable or criterion,
2. Product quality (PQ) the independent variable or predictor significantly influence or associate with the mediators - Product cost (PC) and Product safety (PS)
3. Whether Product cost (PC) and Product safety (PS) the mediator variables influence Customer satisfaction (CS) the dependent variable or criterion and,
4. If the cause of product quality (PQ) values on car safety standards are lowered when product cost (PC) and Product safety (PS) the mediator variables are involved.

Threats to Validity

Threats to validity exist in the use of quantitative approach in research studies. I avoided individual and ecological fallacies in the research study with the use of different strategic data analyses for the domestic market of automobiles. In order to avoid the threats to validity, this study will not use data obtained from one region and apply the same results to other complex regions that may have unique cultures and levels of consumer satisfaction on product quality (Aladwani & Palvia, 2002; Hueiju Yu & Fang, 2009; Saad & Siha, 2008; Serenko, 2010; Tybout, & Calder, 1977).

Frankfort-Nachmias and Nachmias (2008) argued that fallacies occur when generalizing directly from a complex to a simpler unit of analysis, or vice versa. In this study the threats to validity overcame with the use of combined data analysis plan encapsulating the use of robust statistical tools and SPSS software to measure the survey data from reliable prescreened subjects (Frankfort-Nachmias & Nachmias, 2008) accessed by SurveyMonkey Internet Services.

The combination of methods with survey methods overcame any researcher biases because SurveyMonkey provided broad and general data on consumer protection in order to ensure validity of the study. Many American consumers believe in the validity of their surveys on product quality, cost, safety, and reliability as the questionnaires directed to good theoretical hypotheses (Rodchua, 2009).

Similar to this study is the work by Rodchua (2009). Rodchua identified several threats to the validity of establishing the difference between the small-medium enterprises (SMEs) and large ones in term of correlating the independent variables [total

quality cost, prevention cost, appraisal cost, internal failure costs, and external failure costs] with the dependent variables (percentage sales revenue). These threats are the difference in financial resources between SMEs and large organization, the difference in complexity of operation and communication flow between SMEs and large organization, and the researcher's perception on the literature reviews that indicate that the SMEs are less comfortable than large-companies in implementing and developing TQM due to limited financial resources. Moreover, the calculation of quality costs differs from the type of industry to another that may have a threat to the validity of findings (De Mast, 2006; Eckert & Hughes, 2010; Evans, 2005; Hueiju Yu & Fang, 2009; Martinez-Costa & Martinez-Lorente, 2008; Mukhopadhyay, 2004).

Through better choice of research and the pre-identification of threats of validity, as well as understanding the nature of manufacturing operations and typical bureaucracy, Rodchua (2009) successfully explained the associations of two variables (i.e., costs quality and cost revenues for SMEs and for large organizations).

Apart from Rodchua's work, this research study more focused on consumerism considering the cost and safety associated with product quality and the level consumer satisfaction. However, this project study has a similar threat of validity as identified in Rodchua (2009) as both studies dealt with product quality, consumer, and costs in the manufacturing environment.

The validity of the study used hypotheses to determine if a correlation exists between product quality and customer satisfaction. The use of the cost and safety as mediators as well as the use of data cleaning approaches and the tests of statistical

parameters such as *p*- test, *F*-test, R^2, and so forth helped eliminate the threats to validity of the study. However, there was still be a concern as to the threats to validity of this study since the survey focuses on specific American consumers as opposed to global users of automobiles. Automobile consumers of rich nations such as in the U.S are likely to favor product safety over the product cost in answering the survey, but the opposite occurs in the developing nations and poor countries (De Mast, 2006; Eckert & Hughes, 2010; Evans, 2005; Hueiju Yu & Fang, 2009; Martinez-Costa & Martinez-Lorente, 2008; Mukhopadhyay, 2004).

Hence, I synthesized and extrapolated the various peer review articles and concerns and linked them to the objective conditions in the U.S. auto market place to find aspects of constructs to inform consumers' ability to weigh between safe products versus cost. Alternatively, given the spurious existence of good data on these conditions, I expected to attain clear link of quality and consumer satisfaction. If spurious correlation existed in this study, the result may not be applicable to any other nations as this type of relationship is not a true linkage or a perfect correlation. However, the hypotheses of this study are still applicable to the consumers from developing nations and poor countries.

Validity refers to the accuracy of the inferences or interpretations of the test scores. In order to obtain validity, the measurement scale must first be reliable. This study will take into account that reliability and validity as inseparable concepts and they are related to each other. Both reliability and validity of scale verified in the same manner as other measuring methods (Frankfort-Nachmias & Nachmias, 2008). The concepts of validity and reliability are similar, as both indicate a measurement error.

However, validity addresses the question as to whether the measurement done correctly or erroneously in the object that is intended measured. Validity comes in three forms: internal, external, and ecological validities. Internal validity involves in manipulation of independent variables in order to observe changes in the dependent variables because of varying interventions. External validity and ecological validity are similar because the premise of result based on ecologically valid designs normally allow for a more general than those obtained in an artificially produced artificial setting (Frankfort-Nachmias & Nachmias, 2008).

Content validity refers to the extent to which a measure represents all facets of objects or phenomena considered in the study (Frankfort-Nachmias & Nachmias, 2008). In order to ensure a content validity, this study will have to examine the extent to which the measurement represents all the attributes of the concept that will be the result of consumers' choices instead of following the laws of nature. In the study I also uncovered the ways in which individuals and groups of consumers perceive the state of product quality that actually exists, rather than as they imagined. For instance, a scale may lack content validity if it only assesses the affective dimension of satisfaction, but fails to take into account the real meaning of product quality (De Mast, 2006; Eckert & Hughes, 2010; Evans, 2005; Hueiju Yu & Fang, 2009; Martinez-Costa & Martinez-Lorente, 2008; Mukhopadhyay, 2004).

Empirical validity describes how closely scores on a test correlate with measured results (Frankfort-Nachmias & Nachmias, 2008). Therefore, in order to ensure the empirical validity of measurement, the analysis will have to make certain that the test

scores are collected first; then follow them up with the collection of similar criteria later, in which the variables measured to determine the real relation between a test and some criterion measure. This study will ensure that the score obtained through the consumer preference test in the analysis of data, truly reflects consumers' genuine needs.

Construct validity is the extent to which what was to be measured was actually measured (Frankfort-Nachmias & Nachmias, 2008). With this thought, test should be able to relate the measurement to the theoretical ideas behind the major approach to the study of personality and individual differences in order to understand the dynamic and organized set of characteristics possessed by a person that uniquely influences his or her cognitions, motivations, and behaviors in various situations.

Frankfort-Nachmias and Nachmias (2008) referred to the works of Cronbach and Meehl to explain the importance of researchers' adherence for using construct validity in studies to assure reliability. In 1955, Cronbach and Meehl claimed that construct validity had not been obtained when the measurement fails to measure certain property of the theoretical framework, in which case the prediction was flawed. Thus, it is essential to avoid these pitfalls in construct validity of the study, the instrumentation and a statistical algorithm of the methodology section of this study will test measurement.

Absolute adherence of validity and reliability of scales in the study was of a paramount importance. The reason was validity is synonymous with reliability. The latter is the degree to which a measure has consistent errors each time in a given object or phenomena measured by the same instrument procedure (Frankfort-Nachmias & Nachmias, 2008).

In order to ensure reliability of the measurement in this study, I ensured that a set of measurements of variables is consistent and the object or phenomena as measured by the same or identical instrument. It was essential to avoid error in measurement that may lead to measurable values used consistently and erroneously to indicate the inherent unpredictability of events, which may entail different meanings and usages relative to how it is conceptually applied. Measurement is the assignment of numbers to objects or events, which is a cornerstone of this quantitative research study. Predictability is the degree to which a correct prediction or forecast can be made quantitative (De Mast, 2006; Eckert & Hughes, 2010; Evans, 2005; Hueiju Yu & Fang, 2009; Martinez-Costa & Martinez-Lorente, 2008; Mukhopadhyay, 2004).

The unreliability of measurement occurs, for instance, when expected values scatter and result in a null arithmetic mean and when a measurement repeatedly done several times with the same instrument (Frankfort-Nachmias & Nachmias, 2008). Hence, I found it necessary to prevent any unpredictable fluctuations in the readings of a measurement device, or in the experimenter's interpretation of the instrumental reading that may result in interference of the environment with the measurement process. A scale has reliability if a set of test scores has the consistency or stability. Reliability coefficient helps to test and determine the presence of reliability in a scale. The scale is reliable if the coefficient value falls between zero (0) to 1; otherwise, the scale is not reliable at all (Frankfort-Nachmias & Nachmias, 2008).

Indexes and scales help to assess human behavior that is a complex task. For this reason, indexes and scales are “composite measure, constructed by combining two or

more variables that are employed as indicators" (Frankfort-Nachmias & Nachmias, 2008, p. 414). For scales to be reliable, they must be tested and retested with possible modifications happening in between to ensure that they are truly representing the 'complexities inherent in human behavior (Frankfort-Nachmias & Nachmias, 2008).

To increase reliability and precision of these measurements, I used multiple scales and indexes, but researchers should also do a thorough search of previous literature to see if there is any applicable scale. For instance, all of the scales used by Dowling and Quirk (2009) have been used in previous studies thus adding to their reliability. They also used numerous scales to test their results. Dowling and Quirk used a questionnaire, an inventory of Internet use, and four scales ensure validity of the results. The only real critique, however, was the self-reporting element. In self-reporting, participants may over or underestimate how much time they are spending on the Internet that may affect the results (Eckert & Hughes, 2010; Evans, 2005; Hueiju Yu & Fang, 2009; Martinez-Costa & Martinez-Lorente, 2008).

All these concepts of validity were significant in determining the effectiveness of measurement. However, the content validity had no exact procedures in content related evidence (Frankfort-Nachmias & Nachmias, 2008). The absence of precise procedures could have inhibited the ability to evaluate product quality, product cost, product safety, and customer satisfaction (Bresnahan, 2010; Brucks, Zeithaml, & Naylor, 2000; Burgess, 1996; Juran & De Feo, 2010).

Consequently, I found practical contributions of the study to the body of knowledge in quality engineering management and augment the current approach in the

product quality improvement and customer satisfaction enhancement very important (Aggogeri & Gentili, 2008; Bingley, 2011; Eckert & Hughes, 2010; Hill, Zhang, & Gilbreath, 2011; Huehn-Brown & Murray, 2010; Juran, 2010). Hence, I provided a non-biased approach for advancing both theory and practice in quality management, cost control and safety minimization (Barjaktarovic & Jecmenica, 2011; Jones & Sasser, 1995; McLaughlin, 2010; McManus, 2009; Mies, 2009).

Product cost and market share enhancement hypotheses capture top management's attention for quality programs to indicate the quality level and the symptom of problems. It is an important aspect of the development of a quality system and a foundation for building a quality product (Harper & Porter, 2011; He, 2010; Hill, Zhang, & Gilbreath, 2011). Product cost constructs lead to the identification, selection, priority, measurement, evaluation, and monitoring of quality improvements for businesses. Hence, these factors are beneficial to continual improvement at the beginning of a quality journey (Harper & Porter, 2011). Quality cost is a business parameter and performance measure used for planning and controlling future quality costs (Eckert & Hughes, 2010; He, 2010; Chua, 2008).

The existing concept of quality costs is very much influenced by conformance quality or backward looking (must-be) quality, but is less influenced by design quality or forward-looking (attractive) quality (Bresnahan, 2010; Brucks, Zeithaml, & Naylor, 2000; Burgess, 1996). Hence, quality costs depend on how the quality is defined and who (producer or customer) defines it. Thus, quality cost normally presents a measure seen

from the producer's perspective, but seldom from the customer's perspective (Harper & Porter, 2011; Harper, & Porter, 2011; He, 2010; Hill, Zhang, & Gilbreath, 2011).

Product quality (Bresnahan, 2010) is the life-support of quality control, since it ensures that customers can buy high quality products or services with long-lasting reliability. Product quality concepts ensure that processes for assuring safe products exist. The reason is product quality produces uniform output of products. Product quality reduce mistakes and reworks, as well as reducing waste of manpower, machine-time, and materials, and thus increase output with less effort (Eckert & Hughes, 2010).

This research also critically analyzed the theories on quality management and cost in order to discover major gaps in literature on the beliefs of cost management and to explain any philosophical views on different approaches to improving product quality given the investment (Eckert & Hughes, 2010; He, 2010; Chua, 2008). Findings drawn from this study will serve as the foundation for the best practice of quality product and costs that are associated with the improvement as well as understanding the role of effective engineering management in promoting quality products (Bresnahan, 2010; Brucks, Zeithaml, & Naylor, 2000; Burgess, 1996) for consumerism which may lead to a positive social change.

Ethical Procedures

The pending data collection SurveyMonkey Internet Services will involve public participation. The method used will not pose any risk to any human participants (Ellett, 2004; Eysenbach, 2001; Krivobokova, 2009). The study adhered to the strict compliance of the protection of participants' rights, such as confidentiality of names and consent of

all subjects. In order to enhance the validity and generalizability of research results in Chapter 4, I secured Institutional Review Board (IRB) approval and further ensured that all of the procedures and applications were strictly adhered throughout this research study are observed and adhered in the process (Schwarzer, 1999). The application for data collection and analysis encapsulates existing Walden University's IRB guidelines, U.S. government regulations, and the Office of Extramural Research guidelines of the National Institutes of Health (NIH) followed. The consumer satisfaction survey for data collection will not commence prior to the receipt of formal IRB approval from the University.

Ethical concerns in research included protection from harm, informed consent (Appendix *A*), right to privacy, and honesty. Maximum care employed to check any human errors. Hence, I did not engage in research that harms participants in any manner. Therefore, I utilized consent documents notifying participants of informing them of their willingness to voluntarily, engage in the study to meet IRB requirements (Ellett, 2004; Eysenbach, 2001; Krivobokova, 2009).

All participants had the right of privacy by not identifying any respondent. Upon approval of the proposal, the researcher filed an application with the Institutional Review Board (IRB) committee. The final proposal outlined the procedures and information about the prospective participants in order for the board to review and identified the risks to the research participants (Ellett, 2004; Eysenbach, 2001; Krivobokova, 2009). The IRB may include reviews concerning physical, psychological, economic, and legal risk aspects of the study. I will exercise precautions to protect the rights and dignity of the

members of protected groups such as minors, the mentally disabled, the physically disabled, and others who be able to read or understand the consent form (Schwarzer, 1999).

This study may add to the body of knowledge in quality engineering management and will augment the current approach in the product quality improvement and customer satisfaction enhancement. This research provides a non-bias approach for advancing both theory and practice in quality management, cost control and safety minimization. Product cost and market share capture top management's attention for quality programs to indicate the quality level and the symptom of problems. It is an important aspect of the development of a quality system and a foundation for building a quality product. The use of cost usually leads to the identification, selection, priority, measurement, evaluation, and monitoring of quality improvements, which is found to be very beneficial for continual improvement at the beginning of a quality journey. Quality cost is a business parameter and a performance measure that can be used as a means for planning and controlling future quality costs (Aggogeri & Gentili, 2008; Bingley, 2011; Eckert & Hughes, 2010; Hill, Zhang, & Gilbreath, 2011; Huehn-Brown & Murray, 2010; Juran, 2010). The existing concept of quality costs is very much influenced by conformance quality or backward looking (must-be) quality, but is less influenced by design quality or forward-looking (attractive) quality. Hence, quality costs depend on how the quality is defined and who (producer or customer) defines it. Thus, quality cost normally presents a measure seen from the producer's perspective, but seldom from the customer's perspective (Harper & Porter, 2011).

Product quality (Gal & Ograjenšek, 2010; Feigenbaum, 1945) is the life-support of quality control (Hill, Zhang, & Gilbreath, 2011), as it ensures that customers can buy high quality products or services with long-lasting reliability (Huehn-Brown & Murray, 2010; Juran, 2010). Product quality attained by improving the process, which produces uniform output of products, reduces mistakes and rework, as well as reducing waste of labor, machine-time, and materials, and thus increase output with less effort (Feigenbaum, 1945; Hill, Zhang, & Gilbreath, 2011). This research also critically analyzed the theories on quality management and cost in order to discover major gaps in literature on the beliefs of cost management and to explain any philosophical views on different approaches to improving product quality given the investment (Flavio, Filho & Bonney, 2009). Findings drawn from this study will serve as the foundation for the best practice of quality product and costs that are associated with the improvement as well as understanding the role of effective engineering management in promoting quality products for consumers (Flavio, Filho & Bonney, 2009), which may lead to a positive social change.

Summary

The study provided critical results to confirm or reject if there are correlations between the product quality of automobiles, product cost, and product safety to the consumer satisfaction (Cameran, Moizer & Pettiniccbio, 2010; Uli & Bharadwaj, 2009). The reason was ascertaining the relationship between product quality and customer satisfaction in the automobile industry will help boost social change through consumer

safety and affordability in the socio-economic environments in the global market place (Juran & De Feo, 2010; Raturi, 2004; Zinn & Haddad, 2007).

I identified cross-sectional survey research design with multiple regression to find answers to the research questions of the study to assure validity and generalizability. To verify robust results for generalizability I have introduced a mediation regression analysis to determine if there are correlations among the product quality, product cost, and product safety to the consumer satisfaction. In Chapter 2, I reviewed the various theoretical reasoning for and against the need for the study. Additionally, in Chapter 3, I identified the method of data collection, which involves the use of survey. The strategy will provide robust measurements and tests of the various hypotheses outlined.

The method of data collection outlined in this chapter will generate an extensive list of potential data on consumers. The use of survey data collection from reliable, pre-screened subjects helped overcome the threats to validity. Proper definition of hypotheses and testing confirm, refute, or define the internal validity of the study.

This chapter also presented various test approaches prior to conducting a simple linear regression and a multiple linear regression such as, test of outliers, analysis of variance, normality of variables, effect of normality in ANOVA, Pearson's chi-squared test, multicollinearity, covariate analysis, and homogeneity of regression, and models of mediated moderation. Chapter 3 identified the research method, design pertaining to the research questions, and presented the algorithms and models that appropriate production of automobile quality and the level of consumer satisfaction.

I have presented analysis of the variables and research questions with the applications of the equations and models in this chapter along with the assignments of each term and numerical values in Chapter 4. Additionally, I illustrate in-depth derivations of population and sample size and thorough analysis of data in conducting a simple linear regression and a multiple regression analysis as well as the use of the SPSS/PASW statistics software package.

Chapter 4: Results

Consumer perceptions play a role in the growth and development of the automobile industry (Pednekar, 2013). Within the United States, the challenges of producing quality products and maintaining satisfied customers remain unresolved. The purpose of this quantitative research was to examine the relationship between product (quality) and customer satisfaction, while using product cost and product safety as potential mediators. A combination of simple linear regressions and multiple linear regressions was used to examine the relationship between product quality and customer satisfaction. the variables of interest.

Pilot Study

Prior to administering the research questionnaire to a large sample, a pilot test was conducted with three individuals to make sure the survey questions were easy to interpret and that they applied to the topic of interest. Six questions were asked to discuss the validity of the instrument:

1. Are the instructions in the main survey clear and easy to understand?
2. If not, what should be changed?
3. Are the questions/inquiries in the main survey clear and easy to understand?
4. If not, what should be changed?
5. Do the questions/inquiries cover the topic?
6. If not, what questions/inquiries should be added? Should any be changed or deleted?

All three pilot study participants found the instructions for the main survey to be clear and easy to understand. All three pilot participants found the questions and inquiries in the main survey clear and easy to understand. All three pilot participants felt that the questions and inquiries covered the topic of interest. None of the individuals felt that any changes needed to be made to the survey questionnaire. Frequencies and percentages for the responses to the pilot study questionnaire are presented in Table 1.

Table 2

Frequencies and Percentages for Pilot Study Questions

Pilot Study Question	*n*	%
1. Are the instructions in the main survey clear and easy to understand?		
Yes	3	100
No	0	0
2. If not, what should be changed?		
Not applicable	3	100
3. Are the questions/inquiries in the main survey clear and easy to understand?		
Yes	3	100
No	0	0
4. If not, what should be changed?		
Not applicable	0	0
5. Do the questions/inquiries cover the topic?		
Yes	3	100
No	0	0
6. If not, what questions/inquiries should be added? Should any be changed or deleted?		
Not applicable	3	100

Data Collection

The data collection period was 30 days, and there were not any discrepancy in data collection or the actual recruitment and response rates, in which 212 participants

were selected to participate in the study via the data collection website, SurveyMonkey. Twenty seven individuals did not give consent to participating, and 10 individuals did not fill out any of the survey. Three individuals who gave consent to participate in the survey did not reach the age requirement of being at least 18 years or older; thus, these individuals were removed from further analysis. An additional seven participants who gave consent to participate did not fill out significant portions of the survey; thus, these individuals were removed as well from further analysis. After reductions, 77 participants were used in the study. These individuals responded to all five questions regarding car quality, cost, safety, customer satisfaction, and customer confidence.

Research Results

Demographics of Sample

A majority of survey participants (n = 97, 55%) were women. Most participants (n = 50, 29%) were at least 60-years-old. A majority of participants (n = 32, 18%) had a household income between $25,000 and $49,999. Frequencies and percentages for the demographical data are presented in Table 3.

Table 3

Frequencies and Percentages of Demographical Data

Demographic	*n*	%
Gender		
Male	78	45
Female	97	55
Age		
18 – 29	38	22
30 – 44	41	23
45 – 49	46	26
60+	50	29
Household income		
$0 to $9,999	5	3
$10,000 to $24,999	13	7
$25,000 to $49,999	32	18
$50,000 to $74,999	27	15
$75,000 to $99,999	20	11
$100,000 to $124,999	29	17
$125,000 to $149,999	11	6
$150,000 to $174,999	3	2
$175,000 to $199,999	7	4
$200,000 and up	9	5
Prefer not to answer	19	11

Note. Due to rounding error, not all percentages may sum to 100.

A majority of participants (n = 116, 66%) agreed that U.S. cars are durable and dependable. Most participants (n = 79, 45%) neither agreed nor disagreed that U.S. cars are affordable and less expensive to operate. A majority of participants (n = 121, 69%) agreed that U.S. cars are safe to operate. A majority of participants (n = 114, 65%) agreed that consumers are satisfied with most of the U.S. cars' features. Most participants (n = 85, 49%) agreed that most consumers understand quality, pricing, and safety of cars.

Below are the frequencies and percentages analyses and results of the five survey questions in Table 4 and Figures 2-6.

Table 4

Frequencies and Percentages of Questionnaire Responses

Survey Responses	*n*	%
American cars are durable and dependable (product quality)		
Strongly agree	28	16
Agree	88	50
Neither agree nor disagree	37	21
Disagree	21	12
Strongly disagree	1	1
American cars are affordable and less expensive to operate (product cost)		
Strongly agree	13	7
Agree	49	28
Neither agree nor disagree	79	45
Disagree	30	17
Strongly disagree	4	2
American cars are safe to operate (product safety)		
Strongly agree	25	14
Agree	96	55
Neither agree nor disagree	43	25
Disagree	10	6
Strongly disagree	1	1
Consumers are satisfied with most of the American cars' features (customer satisfaction)		
Strongly agree	17	10
Agree	97	55
Neither agree nor disagree	43	25
Disagree	17	10
Strongly disagree	1	1
Most consumers understand quality, pricing, and safety of cars (customer satisfaction)		
Strongly agree	12	7
Agree	73	42
Neither agree nor disagree	43	25
Disagree	41	23
Strongly disagree	6	3

Note. Due to rounding error, not all percentages may sum to 100.

For product safety, Figure 2 shows most participants (n = 85, 49%) agreed that most consumers understand quality, pricing, and safety of cars.

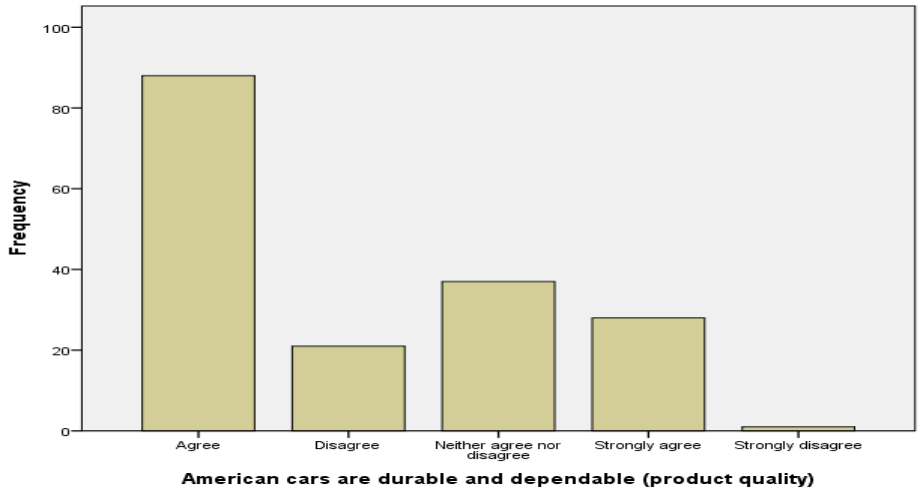

Figure 2. Frequencies and percentages for product quality.

In Figure 3, for product cost, most participants (n = 79, 45%) neither agreed nor disagreed that U.S. cars are affordable and less expensive to operate. I stopped reviewing here due to time constraints. Please go through the rest of your chapter and look for the patterns I pointed out to you. I will now look at Chapter 5.

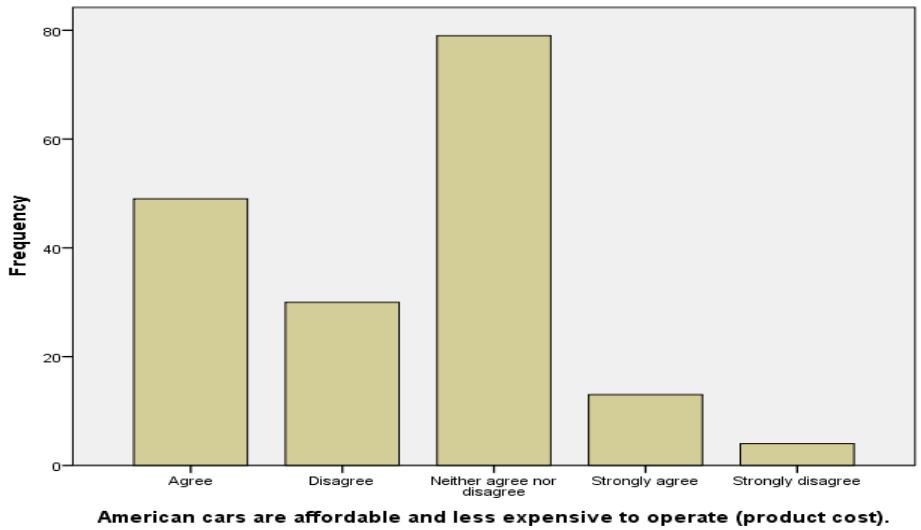

Figure 3. Frequencies and percentages for product cost.

For product safety, most participants (n = 85, 49%) in Figure 4 agreed that most consumers understand quality, pricing, and safety of cars. These consumers agreed that American cars are affordable and less expensive to operate.

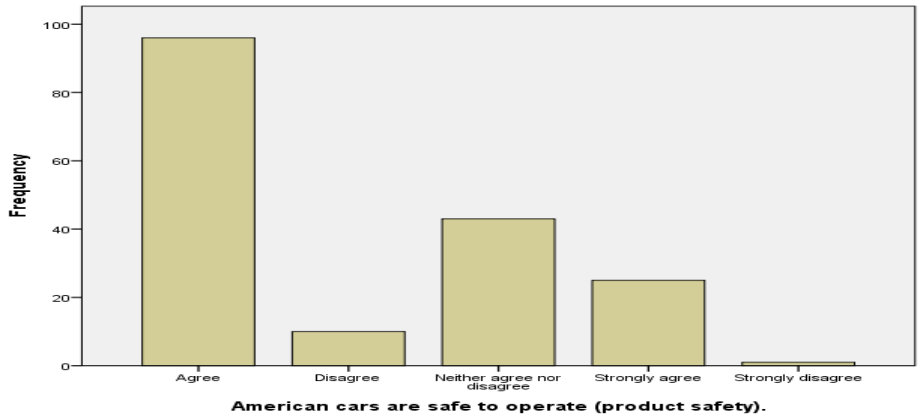

Figure 4. Frequencies and percentages for product safety.

A majority of participants (n = 114, 65%) agreed that consumers are satisfied with most of the American cars' features as shown in Figure 5 below.

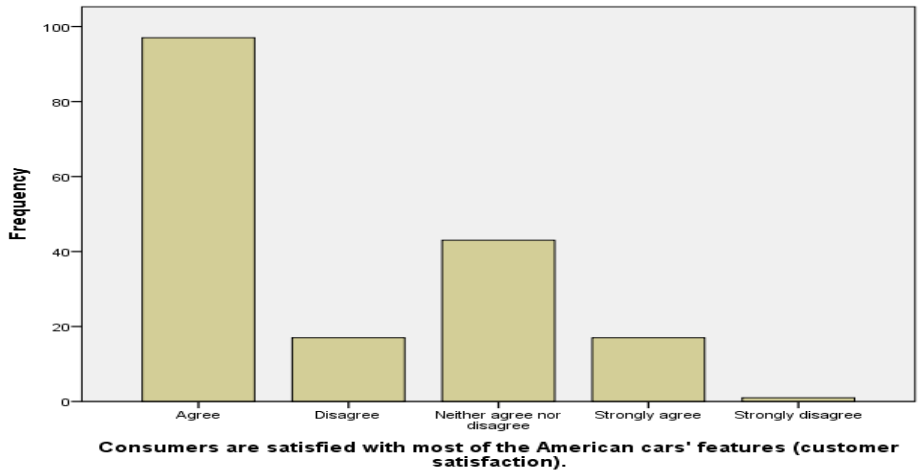

Figure 5. Frequencies and percentages for customer satisfaction.

A majority of participants agreed that American cars are durable and dependable thereby nave confidence in Figure 6.

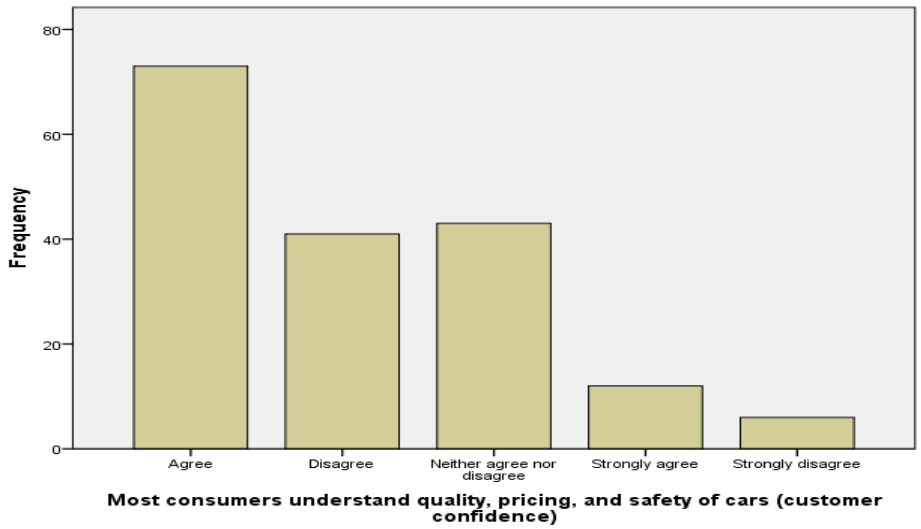

Figure 6. Frequencies and percentages for customer confidence.

Descriptive Statistics of Continuous Variables

Analysis of the five research questions in the study encompassed product quality, product cost, product safety, customer satisfaction, and customer confidence. Responses to these questions were based on a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree). Averages were computed for all five questions to determine general responses. Product quality scores ranged from 1.00 to 5.00, with $M = 3.69$ and $SD = 0.90$. Product cost scores ranged from 1.00 to 5.00, with $M = 3.21$ and $SD = 0.89$. Product safety scores ranged from 1.00 to 5.00, with $M = 3.77$ and $SD = 0.79$. Customer satisfaction scores ranged from 1.00 to 5.00, with $M = 3.64$ and $SD = 0.81$. Customer confidence scores ranged

from 1.00 to 5.00, with $M = 3.25$ and $SD = 1.00$. Means and standard deviations of continuous variables are presented in Table 5.

Table 5

Descriptive Statistics of Continuous Variables

Composite Scores	*Min.*	*Max.*	*M*	*SD*
Product quality	1.00	5.00	3.69	0.90
Product cost	1.00	5.00	3.21	0.89
Product safety	1.00	5.00	3.77	0.79
Customer satisfaction	1.00	5.00	3.64	0.81
Customer confidence	1.00	5.00	3.25	1.00

Research Question: Do consumer satisfaction theory, product quality theory, product cost theory, and product safety theory explains the relationship between consumer satisfaction (dependent variable) and product quality (independent variable) through the mediator variables, product cost, and product safety?

Hypothesis 1

H_0: Product quality is not a significant predictor of consumer satisfaction.

H_1: Product quality is a significant predictor of consumer satisfaction.

Simple Linear Regression

To examine the first hypothesis, a linear regression was conducted to assess if product quality scores predict customer satisfaction. In preliminary analysis, the assumptions of normality were assessed with a P-P scatterplot (see Figure 7). The assumption was met because the points do not deviate strongly from the normality line. The assumption of homoscedasticity was assessed with a residuals scatterplot (see Figure

8). The assumption was met because the points are rectangularly distributed and there is no clear pattern.

The results of the linear regression were significant, $F(1,173) = 87.11$, $p < .001$, suggesting that product quality accounted for (R^2) 37.8% of the variance in customer satisfaction. Product quality was a significant predictor of customer satisfaction, $B = 0.52$, $p < .001$, suggesting that for every one unit increase in product quality, customer satisfaction increased by 0.52 units. The first null hypothesis can be rejected, indicating that product quality is a significant predictor of customer satisfaction. Results of the linear regression are presented in Table 6.

Table 6

Results for Multiple Linear Regression with Product Quality Predicting Customer Satisfaction

Source	*B*	*SE*	β	*t*	*p*
Product quality	0.52	0.06	.58	9.33	.001

Note. $F(1,173) = 87.11$, $p < .001$, $R^2 = 0.33$

Preliminary analysis in Figure 7 includes the assumptions of normality was assessed with a P-P scatterplot for product quality predicting customer satisfaction.

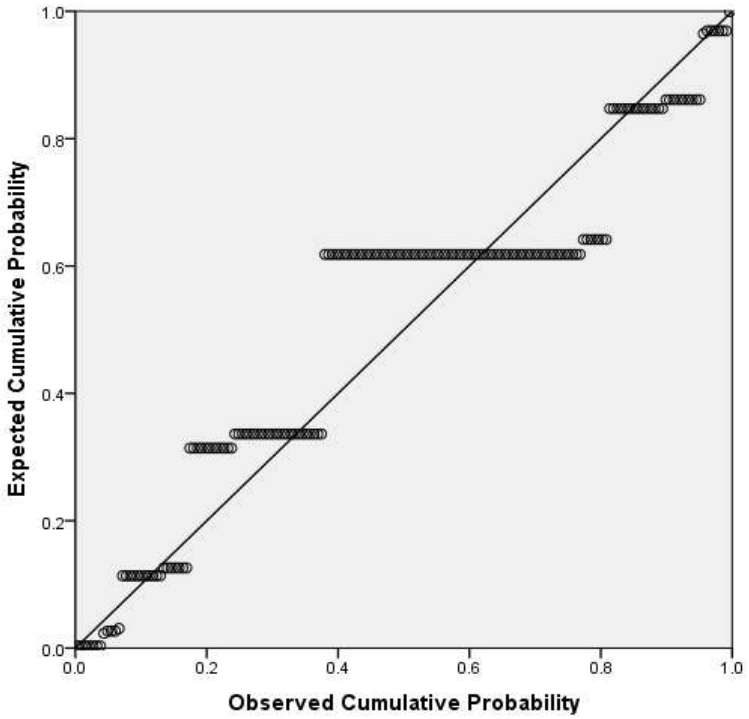

Figure 7. Normal P-P scatterplot for product quality predicting customer satisfaction

Analysis in Figure 8 includes the assumptions of normality was assessed with a P-P scatterplot for product quality predicting customer satisfaction

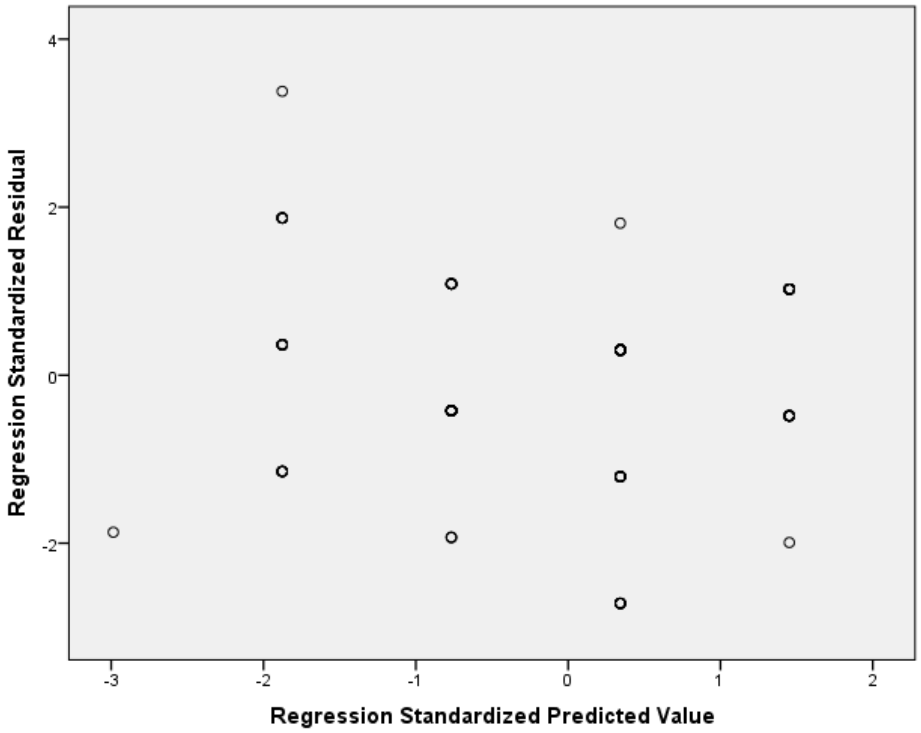

Figure 8. Residuals scatterplot for product quality predicting customer satisfaction

Hypothesis 2

H_0: Product cost is not a significant mediator for the relationship between product quality and customer satisfaction.

H_1**:** Product cost is a significant mediator for the relationship between product quality and customer satisfaction.

Mediation Statistics

To examine the second hypothesis, a Baron and Kenny mediation analysis was conducted to assess if product cost mediated the relationship between product quality and customer satisfaction (Baron & Kenny, 1986). In this analysis, the independent variable is product quality, the mediator is product cost, and the dependent variable is customer satisfaction. To assess for mediation, three regressions were conducted. The assumptions

of normality and homoscedasticity were assessed with visual examinations of scatter plots, and are presented in Figures 9 and 10. Both assumptions were met as the data followed the normal P-P plot trend line and the data were randomly spread in the residuals scatterplot. For mediation to be supported, four items must be met:

1. The independent variable (product quality) must be related the dependent variable (customer satisfaction).
2. The independent variable (product quality) must be related to the mediator variable (product cost).
3. The mediator (product cost) must be related to the dependent variable (customer satisfaction) while in the presence of the independent variable (product quality).
4. The independent variable (product quality) should no longer be a significant predictor of the dependent variable (customer satisfaction) in the presence of the mediator variable (product cost).

First, the regression with product quality (independent variable) predicting customer satisfaction (dependent variable) was conducted. The results of the regression were significant, $F(1, 173) = 87.11$, $p < .001$. This suggests that product quality was statistically associated with customer satisfaction. The first item of the Baron and Kenny method was met.

Second, the regression with product quality (independent variable) predicting product cost (mediator) was conducted next. The results of the regression were significant, $F(1, 173) = 21.28$, $p < .001$. This suggests that product quality was

statistically associated with product cost. The second item of the Baron and Kenny method was met.

Finally, the multiple linear regressions were conducted with product quality (independent variable) and product cost (mediator) predicting customer satisfaction (dependent variable). The results of the regression were significant, $F(2, 172) = 51.84$, $p < .001$. This suggests that product quality and product cost predicted customer satisfaction. Product cost was a significant predictor of customer satisfaction ($B = 0.19$, $p < .001$). The third item of the Baron and Kenny method was met. Product quality was a significant predictor of customer satisfaction ($B = 0.46$, $p < .001$) while in the presence of product cost. Due to the independent variable being a significant predictor in the presence of the mediator, Item 4 of the Baron and Kenny method was not met. Thus, the second null hypothesis cannot be rejected with sufficient evidence suggesting that product cost is not a significant mediator for the relationship between product quality and customer satisfaction. Results of the regressions are presented in Table 7.

Table 7

Regression Results with Product Cost Mediating the Relationship between Product Quality and Customer Satisfaction

Dependent	Independent	*B*	*SE*	β	*t*	*p*
Regression 1:						
Customer satisfaction	Product quality	0.52	0.06	.58	9.33	.001
Regression 2:						
Product cost	Product quality	0.33	0.07	.33	4.61	.001
Regression 3:						
Customer satisfaction	Product quality	0.46	0.06	.51	7.95	.001
	Product cost	0.19	0.06	.22	3.37	.001

Note. First regression: $F(1,173) = 87.11$, $p < .001$, $R^2 = 0.33$
Second regression: $F(1,173) = 21.28$, $p < .001$, $R^2 = 0.11$
Third regression: $F(2,172) = 51.84$, $p < .001$, $R^2 = 0.38$

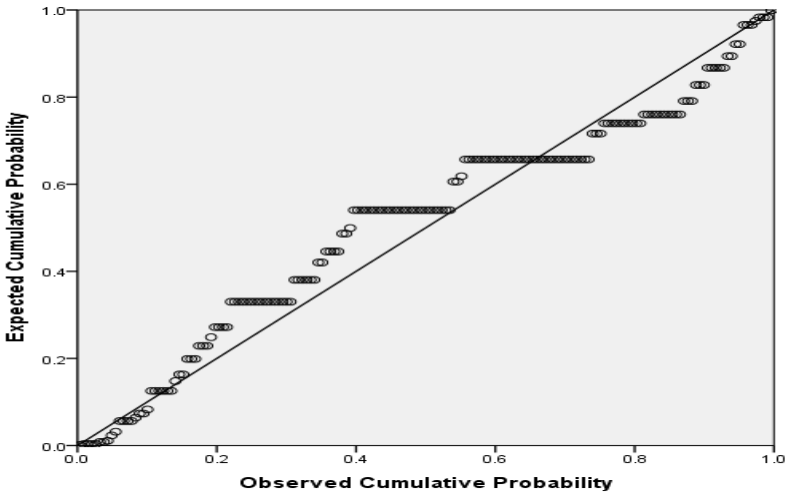

Figure 9. Normal P-P scatterplot for product quality and cost predicting customer satisfaction

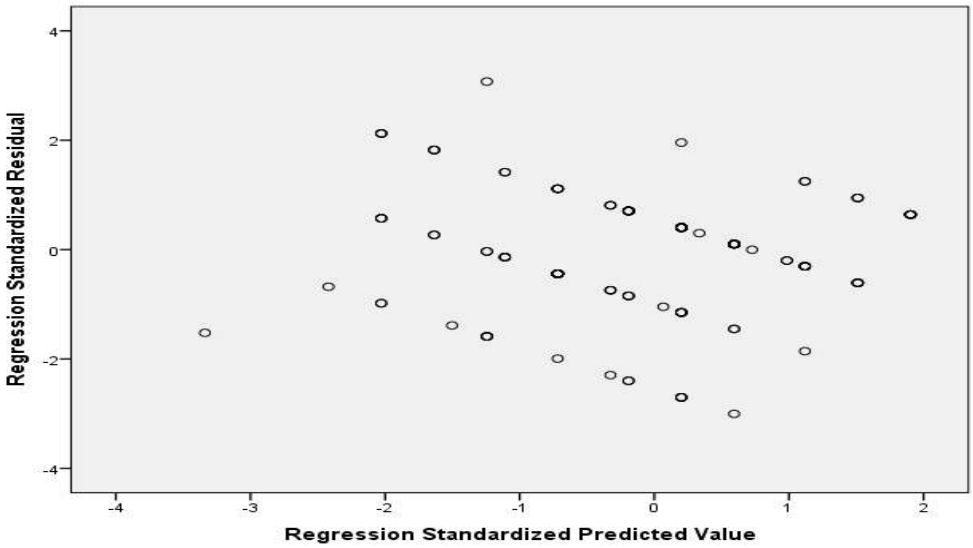

Figure 10. Residuals scatterplot for product quality and cost predicting customer satisfaction.

Hypothesis 3

H_0: Product safety is not a significant mediator for the relationship between product quality and customer satisfaction.

H_1: Product safety is a significant mediator for the relationship between product quality and customer satisfaction.

Mediation Statistics

To examine the third hypothesis, a Baron and Kenny mediation analysis was conducted to assess if product safety mediated the relationship between product quality and customer satisfaction (Baron & Kenny, 1986). In this analysis, the independent variable is product quality, the mediator is product safety, and the dependent variable is customer satisfaction. To assess for mediation, three regressions were conducted. The assumptions of normality and homoscedasticity were assessed with visual examinations

of scatterplots, and are presented in Figures 10 and 11. Both assumptions were met as the data followed the normal P-P plot trend line and the data were randomly spread in the residuals scatterplot. For mediation to be supported, four items must be met:

1. The independent variable (product quality) must be related the dependent variable (customer satisfaction).
2. The independent variable (product quality) must be related to the mediator variable (product safety).
3. The mediator (product safety) must be related to the dependent variable (customer satisfaction) while in the presence of the independent variable (product quality).
4. The independent variable (product quality) should no longer be a significant predictor of the dependent variable (customer satisfaction) in the presence of the mediator variable (product safety).

First, the regression with product quality (independent variable) predicting customer satisfaction (dependent variable) was conducted. The results of the regression were significant, $F(1, 173) = 87.11$, $p < .001$. This suggests that product quality was statistically associated with customer satisfaction. The first item of the Baron and Kenny method was met.

Second, the regression with product quality (independent variable) predicting product safety (mediator) was conducted next. The results of the regression were significant, $F(1, 173) = 152.63$, $p < .001$. This suggests that product quality was statistically associated with product safety. The second item of the Baron and Kenny method was met.

Finally, the multiple linear regression was conducted with product quality (independent variable) and product safety (mediator) predicting customer satisfaction (dependent variable). The results of the regression were significant, $F(2, 172) = 58.47$, $p < .001$. This suggests that product quality and product safety predicted customer satisfaction. Product safety was a significant predictor of customer satisfaction ($B = 0.37$, $p < .001$). The third item of the Baron and Kenny method was met. Product quality was a significant predictor of customer satisfaction ($B = 0.30$, $p < .001$) while in the presence of product safety. Due to the independent variable being a significant predictor in the presence of the mediator, item 4 of the Baron and Kenny method was not met. Thus, the third null hypothesis cannot be rejected with sufficient evidence suggesting that product safety is not a significant mediator for the relationship between product quality and customer satisfaction. Results of the regressions are presented in Table 8.

Table 8, shows Product safety was a significant predictor of customer satisfaction ($B = 0.37$, $p < .001$). Hence, the third item of the Baron and Kenny method was met. Additionally, Product quality was a significant predictor of customer satisfaction ($B = 0.30$, $p < .001$) while in the presence of product safety. The result is because the independent variable is a significant predictor in the presence of the mediator; thus, item 4 of the Baron and Kenny method was not confirmed.

Table 8

Regression Results with Product Safety Mediating the Relationship between Product Quality and Customer Satisfaction

Dependent	Independent	*B*	*SE*	β	*t*	*p*
Regression 1:						
Customer satisfaction	Product quality	0.52	0.06	.58	9.33	.001
Regression 2:						
Product safety	Product quality	0.60	0.05	.68	12.35	.001
Regression 3:						
Customer satisfaction	Product quality	0.30	0.07	.33	4.09	.001
	Product safety	0.37	0.08	.36	4.49	.001

Note. First regression: $F(1,173) = 87.11$, $p < .001$, $R^2 = 0.33$
Second regression: $F(1,173) = 152.63$, $p < .001$, $R^2 = 0.47$
Third regression: $F(2,172) = 58.47$, $p < .001$, $R^2 = 0.41$

Figures 11 and Figure 12 represent the assumptions of normality and homoscedasticity. These constructs were assessed with visual examinations of scatterplots, and are presented to show that both of the assumptions were met as the data followed the normal P-P plot trend line in Figure 11 and the data were randomly spread in the residuals scatterplot in Figure 12. These mediation analyses are supported; hence, four items must be met.

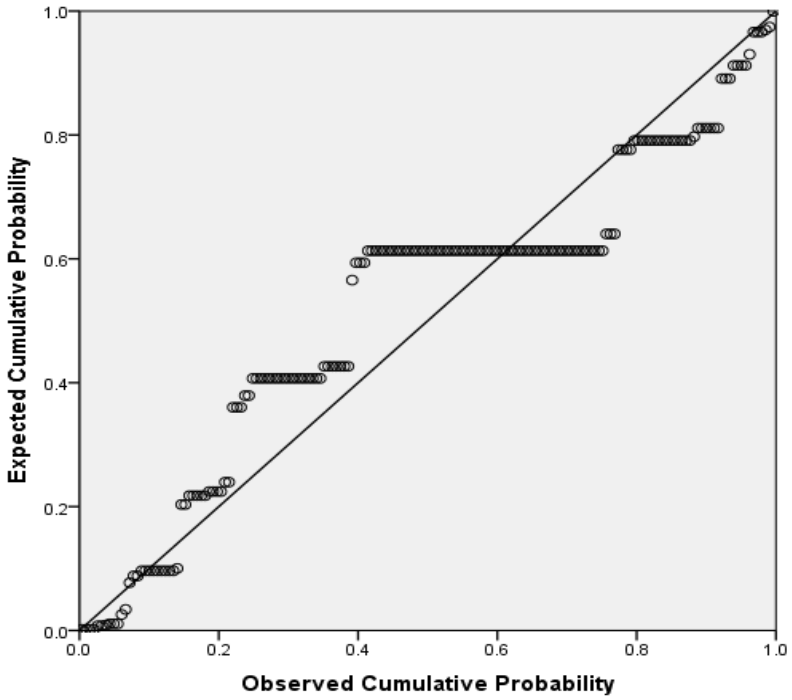

Figure 11. Normal P-P scatterplot for product quality and safety predicting customer satisfaction

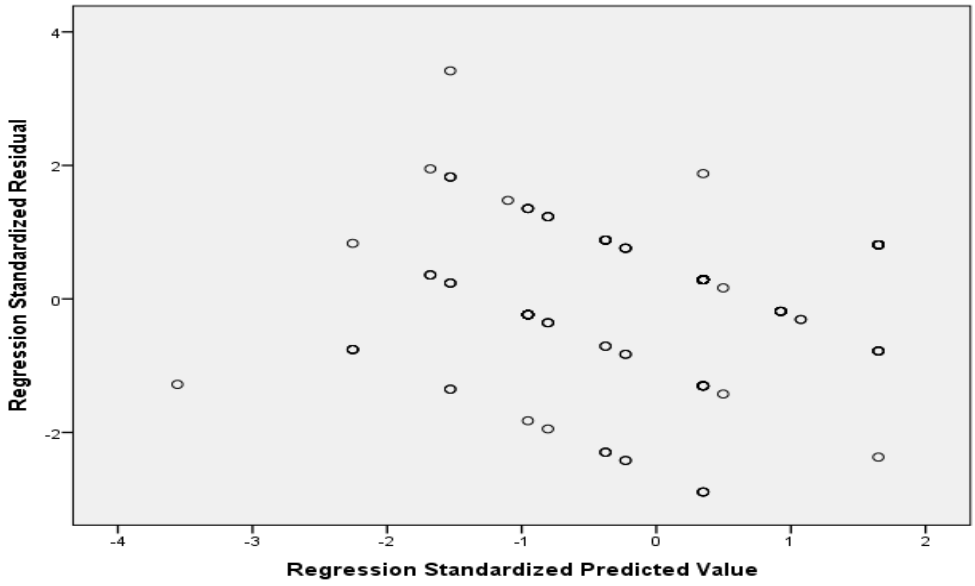

Figure 12. Residuals scatterplot for product quality and safety predicting customer satisfaction.

Summary

Using SPSS software (Field, 2009; Finn, 2011), three hypotheses were examined in this study with a combination of simple linear regressions and multiple linear regressions, to determine the predictive and mediating effect product quality, product cost, product safety have on customer satisfaction. The first hypothesis examined the predictive effect product quality has on customer satisfaction. There was sufficient evidence to reject the first null hypothesis, suggesting that there is a statistically predictive effect between product quality and customer satisfaction. The second hypothesis examined the mediating effect that product cost has on the relationship between product quality and customer satisfaction.

The final step of the Baron and Kenny method was not met for this mediation analysis; thus, the second null hypothesis could not be rejected. There was not sufficient evidence to suggest that product cost was a significant mediator of the relationship between product quality and customer satisfaction.

The third hypothesis examined the mediating effect that product safety has on the relationship between product quality and customer satisfaction. The final step of the Baron and Kenny method was not met for this mediation analysis; thus, the third null hypothesis could not be rejected. There was not sufficient evidence to suggest that product safety was a significant mediator between product quality and customer satisfaction.

Chapter 5: Discussion, Conclusions, and Recommendations

This chapter includes a discussion of the empirical research analysis and results contained in Chapter 4. The results of this study encompassed (a) review of the central research questions of the study; (b) the evaluation and estimations of the findings from the study, corresponding implications for product quality and customer satisfaction that enhances social change in the United States and the global environments; and (c) recommendations for future research and professional practice.

The fundamental objective of the study was to examine the relationship between product quality and customer satisfaction, using product cost and product safety as mediators. The goal included examining and evaluating the variables in this study to ascertain the relationship between product quality and customer satisfaction in the U.S automobile industry marketplace. The secondary objective was to understand the consumer needs in purchasing U.S. automobiles.

I used a quantitative cross-sectional survey research design (Frankfort-Nachmias, & Nachmias, 2008) and the descriptive, multiple regression, and mediation statistics techniques (Field, 2009) to uncover and assess the relationships between the predictors and provide analysis of the variables of the study. The data analysis involved measurements of automobile product-based quality and U.S. automobile customer responses to market surveys (Componation, Youngblood, Utley, & Farrington, 2008; Hald, 1998; Harter, 1999; Platzer & Harrison, 2009).

Interpretation of the Findings

The purpose of this quantitative survey study was to examine the relationship between product quality and customer satisfaction, using product cost and product safety as mediators. The primary objective included examining and evaluating the variables in this study to determine the relationship between product quality and customer satisfaction in the U.S automobile industry marketplace. The secondary objective was to understand the consumer needs in purchasing U.S. automobiles.

I used a quantitative cross-sectional survey research design with multiple regression and mediation statistical techniques to determine the relationship between the predictors and the DV. Results from this study confirm peer-reviewed articles synthesized in Chapter 2. The results inform researchers, the automobile manufacturing professional managers, and other stakeholders.

In order to facilitate the objective of the study, I performed estimations of the three hypotheses outlined in Chapter 3 of the study. Statistical estimations were conducted to evaluate the hypotheses. The results of the estimations were reported in Chapter 4 in which discussions of the various findings and implications for minimizing customer concerns in respect to fatalities identified and synthesized in Chapter 2. The constructs for product quality, product cost, product safety, and customer satisfaction reported here in Chapter 5 to address vehicular (cars) fatalities to boost positive social change in the United States as a proxy for the global automobile industry.

A pilot test was conducted with three randomly selected persons to ensure that the survey questions were easy to understand and that they applied to the topic of the study

and the central questions of the study. Six questions were asked to discuss the validity of the instrument:

1. Are the instructions in the main survey clear and easy to understand?
2. If not, what should be changed?
3. Are the questions/inquiries in the main survey clear and easy to understand?
4. If not, what should be changed?
5. Do the questions/inquiries cover the topic?
6. If not, what questions/inquiries should be added? Should any be changed or deleted?

All of the three pilot study participants affirmed the clarity, comprehension, and validity of the instructions for the main survey. The three pilot participants confirmed that the questions and inquiries in the main survey were clear, succinct, and easy to understand. All of the three pilot participants concluded and submitted that the questions and inquiries covered the topic of interest. None of these participants requested for revision(s) to the survey questionnaires. Frequencies and percentages for the responses to the pilot study questionnaires are presented in Table 2 of Chapter 4.

The main survey encompassed 175 final participants. These individuals responded to all of the five questions regarding car quality, cost, safety, customer satisfaction, and customer confidence. The questions fueled the central question used in the study in relation to product quality, product cost, product safety, customer satisfaction, and customer satisfaction. Responses to survey questions were contingent upon a 5-point

Likert scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, and 5 = *strongly agree*).

The average estimations were computed for all of the five questions to uncover survey responses. In the estimations, product quality score ranged from 1.00 to 5.00, with $M = 3.69$ and $SD = 0.90$. Product cost score ranged from 1.00 to 5.00, with $M = 3.21$ and $SD = 0.89$. Product safety score ranged from 1.00 to 5.00, with $M = 3.77$ and $SD = 0.79$. Customer satisfaction score ranged from 1.00 to 5.00, with $M = 3.64$ and $SD = 0.81$. Customer confidence scores ranged from 1.00 to 5.00, with $M = 3.25$ and $SD = 1.00$. I presented the means and standard deviations of continuous variables in Table 4.
This type of result was an important development for the study because it demonstrates the importance of using robust researcher tools such as SPSS to analyze survey responses.

Below is the research question and corresponding results of the three hypotheses in the study

1. Do consumer satisfaction theory, product quality theory, product cost theory, and product safety theory explain the relationship between consumer satisfaction (DV) and product quality (IV) through the mediator variables, product cost, and product safety?

For Hypothesis 1, I used a SLR method (see Table 6) to examine the first hypothesis to assess whether product quality scores predict customer satisfaction. Preliminary analysis of Hypothesis 1 encompassed the assessment of the assumptions of normality with a P-P scatterplot (see Figure 6). The assumption was met because the points did not deviate strongly from the normality line. The measurement for the

assumption of homoscedasticity resulted with a residuals scatterplot (see Figure 7), which confirmed the assumption because the points were rectangularly distributed and there was no clear pattern.

The results of the linear regression were significant, $F(1,173) = 87.11$, $p < .001$, suggesting that product quality accounted for (R^2) 37.8% of the variance in customer satisfaction. Product quality was a significant predictor of customer satisfaction, $B = 0.52$, $p < .001$, suggesting that for every one unit increase in product quality, customer satisfaction increased by 0.52 units. Therefore, the first null hypothesis can be rejected, indicating that product quality is a significant predictor of customer satisfaction.

This finding clearly supports Harper and Porter (2011), which posited that product quality design engineers should constantly watch for opportunities to apply their technical knowledge, skills, abilities, and proficiencies to create better consumer products that meet customer satisfaction. As previously synthesized in Chapter 2, production of enhanced safety products not only satisfy consumers but has greater propensity for minimizing costs associated with recalls and accidental acts resulting from product defects as a consequence of intentional production or manufacturing of inferior good and services to the consuming public (Krasnikov, Jayachandran, & Kumar, 2009).

For Hypothesis 2, a Baron and Kenny mediation analysis was made to measure to find if product cost mediated the relationship among product quality and customer satisfaction (Baron and Kenny, 1986). The independent variable used is product quality, the mediator is product cost, and the dependent variable is customer satisfaction. In order to estimate for mediation, three regressions were performed. The assumptions of

normality and homoscedasticity were also estimated with visual examinations of scatterplots, and are presented in Figures 8 and 9. Both assumptions were met as the data followed the normal P-P plot trend line and the data were randomly spread in the residuals scatterplot. The below four assumptions guided and supported the estimations:

1. The independent variable (product quality) must be related the dependent variable (customer satisfaction).
2. The independent variable (product quality) must be related to the mediator variable (product cost).
3. The mediator (product cost) must be related to the dependent variable (customer satisfaction) while in the presence of the independent variable (product quality).
4. The independent variable (product quality) should no longer be a significant predictor of the dependent variable (customer satisfaction) in the presence of the mediator variable (product cost).

First, the regression analysis with product quality as the independent variable predicting customer satisfaction, the dependent variable result showed significant, $F(1, 173) = 87.11$, $p < .001$. The result for this segment computation connotes that product quality was statistically associated with customer satisfaction. Hence, the first requirement of the Baron and Kenny method was met.

Second, the regression with product quality, the independent variable, which predicted product cost, the mediator was conducted next and resulted with significant, $F(1, 173) = 21.28$, $p < .001$. This outcome suggested that product quality was statistically

associated with product cost, which result in effect confirmed or met the second requirement of the Baron and Kenny statistical method.

Finally, using a multiple linear regression method, product quality, the independent variable and product cost, the mediator, predicted customer satisfaction, the dependent variable, which resulted significant, $F(2, 172) = 51.84$, $p < .001$. This finding suggested that product quality and product cost predicted customer satisfaction. Hence, Product cost was a significant predictor of customer satisfaction ($B = 0.19$, $p < .001$). Thus, the third item of the Baron and Kenny mediational statistical principle was met. Product quality was a significant predictor of customer satisfaction ($B = 0.46$, $p < .001$) measured with product cost. Due to the independent variable being a significant predictor in the presence of the mediator, Item 4 of the Baron and Kenny method was not met. Thus, the second null hypothesis cannot be rejected with sufficient evidence suggesting that product cost is not a significant mediator for the relationship between product quality and customer satisfaction. Results of the regressions have been outlined in Table 6 in Chapter 4.

For hypothesis three, I performed a Baron and Kenny mediation analysis to estimate and find whether product safety mediated the relationship between product quality and customer satisfaction (Baron & Kenny, 1986). In this analysis, the independent variable was product quality, the mediator was product safety, and the dependent variable analyzed as customer satisfaction. Baron and Kenny (1986) posited to an effective way for estimating or measuring for mediation. Hence, three regressions performed. The assumptions of normality and homoscedasticity evaluated with visual

examinations of scatterplots, and were presented in Figures 10 and 11 of Chapter 4. Both assumptions were met because the data followed the normal P-P plot trend line and the data were randomly spread in the residuals scatterplot with the support and confirmation of the four below assumptions:

1. The independent variable (product quality) must be related the dependent variable (customer satisfaction).
2. The independent variable (product quality) must be related to the mediator variable (product safety).
3. The mediator (product safety) must be related to the dependent variable (customer satisfaction) while in the presence of the independent variable (product quality).
4. The independent variable (product quality) should no longer be a significant predictor of the dependent variable (customer satisfaction) in the presence of the mediator variable (product safety).

In the next step of the estimations, first, I analyzed the regression with product quality the independent variable and used predict customer satisfaction as the dependent variable. The outcome showed the regression were significant, $F(1, 173) = 87.11$, $p < .001$. This result connotes that product quality was statistically associated with customer satisfaction; hence, the first item of the Baron and Kenny method in the context was met.

Second, in the regression analysis I used product quality, the independent variable to predict product safety (mediator) and the result of the regression were significant, $F(1, 173) = 152.63$, $p < .001$. The result suggests that product quality was statistically

associated with product safety. Thus, the second requirement of the Baron and Kenny method was met.

Finally, I conducted a multiple linear regression to measure product quality, the independent variable and product safety, and mediator to predict customer satisfaction the dependent variable. The result of the estimation was significant, $F(2, 172) = 58.47$, $p < .001$. This form of result suggests that product quality and product safety predicted customer satisfaction. Hence, Product safety was a significant predictor of customer satisfaction ($B = 0.37$, $p < .001$) ensuring that the third item of the Baron and Kenny method was confirmed. The result depicted Product quality was a significant predictor of customer satisfaction ($B = 0.30$, $p < .001$) when product safety was included in the estimations. The reason is attributable to the independent variable being a significant predictor in the presence of the mediator, whereas item 4 of the Baron and Kenny method was not met. Thus, the third null hypothesis cannot be rejected with sufficient evidence, which clearly suggests that product safety is not a significant mediator for the relationship between product quality and customer satisfaction. The results of the regression analysis are presented in Table 8 of Chapter 4.

Some of the take away from the results of this study shows that product safety has significant relationship between product quality and customer satisfaction, hence consumers closely review and apply safety features of small cars with passengers less than 8 to their decisions before choices of acquisitions and fulfillments were made. These findings closely align with the hypotheses of Product quality findings on product quality, production failures, and consumer complaints (Juran & De Feo, 2010). The reason was

researchers have investigated classical and contemporary theories associated with the need for high-quality of consumer products encapsulating the hypothesis of Quality control (Anderson, Fomell, & Lehmann, 1994), product quality and customer satisfaction (Fetscherin & Toncar, 2009; Juran & De Feo, 2010; Tsai, 2010; McLaughlin, 2010; Saleh, 2008; Verhoef, & Lemon, 2013).

Limitations of the Study

The limitations of this research study pertained to the generalizability, trustworthiness, validity, and reliability of the three hypotheses examined in this study utilizing a combination of simple linear regressions and multiple linear regressions, to determine the predictive and mediating effect product quality, product cost, and product safety have on customer satisfaction.

The survey was conducted through the Internet. The target population consisted of $N = 77$ randomly selected U.S. automobile customers. A statistical causal-comparative multiple regression method was used to decide rationale, or reasons, for consumer preferences associated with automobiles ranging from small vehicles with passengers less than eight. The quantitative methods identified were robust and widely accepted by researchers hence I analyzed the research questions and hypotheses for validation through tests of the data for reliability and generalizability of the result. I selected this technique because Manufacturers had hundreds of customers, scattered around the nation, and the only way they can determine the level of customer satisfaction was by conducting a survey (Lakeman, 1977; He, 2010).

Furthermore, I did not use incomplete response data because the use of other proxies for the automobile customer market has the tendency of providing negative adversarial impact on research results of this study. The reason is empirical data is used to measure the various hypotheses that correlate with customer satisfaction, validate and generalize the findings and results of the research, and will cover the level of customer satisfaction in the U.S. automobile market (Bang, Melewar, & Chen, 2013).

The generalizability, trustworthiness, validity, and reliability of the research is hinged on results of analyses showing a majority of participants (n = 116, 66%) from the survey that agreed that American cars are durable and dependable. Most participants (n = 79, 45%) neither agreed nor disagreed that American cars are affordable and less expensive to operate. Nonetheless, higher percentage of participants (n = 121, 69%) agreed that American cars are safe to operate.

Additionally, majority of participants (n = 114, 65%) agreed that consumers are satisfied with most of the American cars' features. Most participants (n = 85, 49%) agreed that most consumers understand quality, pricing, and safety of cars. Frequencies and percentages of the five survey questions were presented in Table 4 and Figures 2-6 in Chapter 4 in support of the findings. The result showed and confirmed the importance of Consumer perceptions as a critical component in the growth and development of the Automobile Industry (Pednekar, 2013). It is important to note that I did not digress from normality measurements during the estimations. The reason was to assure that any existence of autocorrelation was detected so it does not cast doubt on the reliability of inferences from the estimated regression coefficients.

Recommendations

Recommendations for further studies are grounded on the strengths of limitations identified to address the central problem of the research study. The problem was that producing quality product and satisfying customers in the U.S. remains unresolved. Negative customer satisfaction and decreased customer loyalty continued to emerge. The reason is consumers compare product quality, product cost, and product safety features associated with competitive product offerings.

The objective for the study was to perform a quantitative survey study to examine and evaluate the relationship between product quality and customer satisfaction, using product cost and product safety as mediators. The primary objective included examining and evaluating the variables to find the relationship between product quality and customer satisfaction in the U.S automobile industry marketplace. The secondary objective was to understand the consumer needs in purchasing American automobiles.

The importance for continued understanding of consumer needs in purchasing American automobiles and providing more safe cars to mitigate vehicular fatalities and injuries cannot be overemphasized. Therefore, I offer these recommendations for related research studies in the field of Engineering Management education and enhancements of professional Engineering Management practices. Given the results of the linear regression were significant, suggesting that product quality accounted for (R^2) 37.8% of the variance in customer satisfaction. Product quality was a significant predictor of customer satisfaction, which suggested that for every one-unit increase in product quality, customer satisfaction increased by 0.52 units. An additional research was needed

regardless of the rejection of the first null hypothesis, which indicates that product quality is a significant predictor of customer satisfaction. Both assumptions for the mediation analyses were met as the data followed the normal P-P plot trend line and the data were randomly spread in the residuals scatterplot shown in Chapter 4.

Due to the independent variable being a significant predictor in the presence of the mediator, item 4 of the Baron and Kenny method was not met. Therefore, I did not reject the second null hypothesis with sufficient evidence, which suggested that product cost is not a significant mediator for the relationship between product quality and customer satisfaction. Results of the regressions presented in Table 7.

Therefore, an additional study is appropriate to help management of organizations to make informed decisions that will affect product safety (cars) and customer satisfaction positively to enhance Social change in the U.S and the global marketplace. This will ultimately help to minimize fatalities reported by National Safety Council (NSC) (Chaudha, Jain, Singh, & Mishra, 2011; Gosnik & Jujica-Herzog, 2010; Harper & Porter, 2011; Jujica-Herzog, 2010; Lofgren & Witell, 2008).

Implications for Social Change Impacts through Sustainable Product Safety and Customer Satisfaction Econometric Modeling

Positive social change is harmonious with socioeconomic factors that are congruent upon capitalists essentials associated with high-quality and durable products, product costs, and product safety that allows for consumer product safety, and affordability that leads to customer satisfaction. The various regression estimations conducted and reported in Chapter 4 of this study serve as enhanced contemporary

foundation for best practices for business entities for product quality, product safety, and mitigations of product costs benefiting businesses and consumers (Chaudha, Jain, Singh, & Mishra, 2011).

These findings associated with the need for enhanced product safety improvements will undoubtedly assist Engineering Management practitioners to understand roles required of engineering and production line management to be effective in promoting high-quality products for consumers at affordable costs. The results of the study seek to lead mitigation strategies for vehicular (cars) mortality rate associated with unsafe automobile productions in the U.S. (Cudney, 2009).

Additionally, the results seek to foster positive social change in the U.S. because United States of America is a proxy for enhancing consumer product fulfillments in the global markets. The increase in automobile transportation efficiency and effectiveness attributable to the validity of the results of this research investigation will translate into fewer accidents and lower car repair costs (Harper, 1993; Luo Xueming, & Bhattacharya, 2006; Platzer & Harrison, 2009).

These factors are part of critical solutions needed to promote elements that have the propensity to lead to positive social change in the global automobile marketplace. This is because implications for social change include assisting manufacturers and product designers to incorporate customer needs fully, in the production and acquisitions of high-quality automobiles at affordable prices (Glaser, 2010; Platzer & Harrison, 2009; Sajeva & Jucevicius, 2010).

The quantitative methods of regression estimations utilized in this study provided results that greatly mitigate negative empirical implications and add to the foundation or part of the solutions identifiable for constructing high quality products that provides robust levels of safety standards to assure positive social change. This is especially true because this research confirmed the most significant gains in product quality and productivity are consumers' satisfaction on goods and services offered for sale (Salegna & Fazel, 2011). This is because safety products are tantamount to the objectives for saving human lives that maximizes corporate social responsibility. These concepts point toward quality management based on selection and application of the best solutions for solving industrial and organizational problems (Suma & Nair, 2008; Srinivasan & Hanssens, 2009; Voas, 1999).

Results of this study will foster Social change because assumptions for the mediational estimations were met as the data followed the normal P-P plot trend line and the data were randomly spread in the residuals scatterplot in figures 11 and 12, because mediation to be supported, four items must be met (Baron & Kenny, 1986).

Conclusion

The objective of the study encapsulated the empirical examination of the relationships between key variables of product quality, customer satisfaction, product cost, and product safety as the independent variables and customer satisfaction, as the dependent variable to identify the relationship existed among product quality related to car quality and customer satisfaction in the U.S. automobile market.

The National Safety Council (NSC) estimated that 35,200 people died in U.S. traffic accidents and about 3.8 million traffic crash injuries requiring medical attention occurred during 2013. The auto-related fatalities, injuries, and property damage during 2013 came with a high price tag of $267.5 billion, which included medical expenses, employer costs, lost wages, property damages, and related expenses. The NSC estimated costs excluded the manufacturers' expenses resulting from car recalls. So far, at the end of 2014, U.S. automakers have issued over 550 recalls affecting more than 52 million vehicles, which shattered the old full-year record of 30.8 million recalled vehicles set in 2004. Ford alone has recalled more than 202,000 cars, vans, and trucks in North America in five separate recalls to fix gas leaks, air bag sensors, steering shafts, and other issues (Natarajan, Soundararajan, & Jayakrishnan, 2013; Setó-Pamies, 2012).

Field (2009) and Nachmias et al. (2009) argued for the use of quantitative research methods to administer estimations of theoretical and empirical reliability and validity of constructs needed to appraise survey data. The methodology provided the ability to analyze product quality construct to enhance product safety and customer satisfaction pertaining to cars in the U.S automobile marketplace statistically; I uncovered high quality academic literatures of product safety and customer satisfaction theories synthesized in Chapter 2, which encapsulated peer-reviewed articles.

The literatures examined, survey data obtained and quantitatively analyzed confirm the applicability for Engineering Managers' obligations to implement the necessary contingencies to enhance product quality and product safety standards to meet consumer flavors and customer satisfaction expectations.

The findings posited in the results segment of Chapter 4 of this study complimented studies that argued that, in the U.S., in general, customer satisfaction is the key to running a successful business (Krivobokova, 2009; Setó-Pamies, 2012). Furthermore, design engineers need to use skill sets based on the application of enhanced technical knowledge that encapsulates product quality, cost control, and safety to meet customer expectations and satisfaction to mitigate vehicular (cars) fatalities and injuries (Eckert & Hughes, 2010; Harper & Porter, 2011; Power, Schoenherr, & Samson, 2011).

This quantitative research project examined the relationship between product quality and customer satisfaction. The challenges of producing quality product and satisfying customers in the U.S. still remain unresolved. Negative customer satisfaction and decreased customer loyalty continue to emerge, because consumers compare product quality, product cost, and product safety features associated with competitive product offerings. The National Safety Council (NSC) estimated that 35,200 people died in U.S. traffic accidents and about 3.8 million traffic crash injuries requiring medical attention occurred during 2013. The NSC found that product recalls, car repairs, injuries, and deaths were due to unsafe product designs or inferior product quality. The purpose of this nonexperimental, correlation research was to examine relationships among product quality, product cost, product safety, and consumer satisfaction. The hypotheses addressed the research question, which inquires if relationship exists between product quality and customer satisfaction and if product cost, and product safety influence this relationship. For data, I randomly selected ($N = 77$) U.S. automobile users as the target sample. The theoretical foundation captured the theories on product quality and consumer

satisfaction associated with the cost and safety theories. Product quality and customer satisfaction are critical factors that can promote positive social change. High-quality cars lead to fewer injuries and deaths associated with vehicular accidents. These achievements are positive social change for U.S. automobile buyers, industry practitioners, and other stakeholders, and may act as proxy for the global automobile market.

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Appendix A: Consent Form

You are invited to take part in a research study of car quality, cost, safety, and consumer satisfaction. The researcher is inviting who are abled car users, who are subscribers to the SurveyMonkey Website to be in the study. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

This study is being conducted by a researcher named Albert V. Cruz, who is a doctoral student at Walden University.

Background Information:
The purpose of this study is to examine the level of customer satisfaction in terms car quality, cost, and safety.

Procedures:
If you agree to be in this study, you will be asked to:

- Select you answer to a set of questions by typing an *X* on one of the selections from a scale from *strongly disagree* to *strongly agree*.
- The questionnaires contain five items arranged in rows, which can be completed in 15 minutes.
- This will be a one-time data collection.

Here are some sample inquiries:

1. American cars are durable and dependable (product quality).

2. American cars are safe to operate.

3. American cars are inexpensive to buy and operate.

4. American consumers are satisfied with most of the cars' features.

5. Most American consumers understand quality, pricing, and safety of cars.

Voluntary Nature of the Study:

This study is voluntary. Everyone will respect your decision of whether or not you choose to be in the study. No one at Walden University, including students, faculty members, and staffs, or and other institutions will treat you differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind later. You may stop at any time.

Risks and Benefits of Being in the Study:
Being in this type of study involves some risk of the minor discomforts that can be encountered in daily life, such as minimal fatigue, slight stress, or becoming upset. Being in this study would not pose risk to your safety or wellbeing.

The study will benefit car consumers and manufacturers. The result of this study may help manufacturers improve automobile quality, increase safety features, and lower cost based on the customer responses.

Payment:
There no monetary compensation for the participant of this survey; however, the results of this study will benefit consumers and manufacturers

Privacy:
Any information you provide will be kept anonymous, because the researcher, has no means to know you. The researcher will not use your personal information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in the study reports. Data will be kept secure by using computer dish and stored in the Bank of America vault or lack box. Data will be kept for a period of at least 5 years, as required by the university.

Contacts and Questions:
You may ask any questions you have now. Or if you have questions later, you may contact the researcher via XXX-XXX-XXX and/or email. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is XXX-XXX-XXXX. Walden University's approval number for this study is IRB will enter approval number here and it expires on IRB will enter expiration date.

Please print or save this conse**nt form for your records.**

Statement of Consent:
I have read the above information and I feel I understand the study well enough to make a decision about my involvement. By replying to this email with the words, "I consent", I understand that I am agreeing to the terms described above.

Signed: albert.cruz2@waldenu.edu

Appendix B: Survey

Given the factors such as product quality, product cost, product safety, and consumer confidence -- select the appropriate responses by clicking in the box below the chosen scale and enter "X". For example:

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
			X	

1. American cars are durable and dependable (product quality).

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree

2. American cars are affordable and less expensive to operate (product cost).

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree

3. American cars are safe to operate (product safety).

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree

4. Consumers are satisfied with most of the American cars' features (customer satisfaction)

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree

5. Most consumers understand quality, pricing, and safety of cars (customer confidence).

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree