

**ENHANCING THE QUALITY OF SEMI LUXURY
APARTMENT CONSTRUCTION PROCESS USING
TOTAL QUALITY MANAGEMENT TO ENSURE
CUSTOMER SATISFACTION**

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Degree of Master of Science

Department of Building Economics

University of Moratuwa

Sri Lanka

April 2022

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Dissertation submitted in partial fulfilment of the requirement for the degree Master
of Science in Project Management

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DECLARATION

I declare that this is my own work and this dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Date

The above candidate has carried out research for the masters Dissertation under my supervision.

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Dr. (Mrs.) Sachie Gunatilake

Supervisor

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Date

ABSTRACT

ENHANCING THE QUALITY OF SEMI LUXURY APARTMENT CONSTRUCTION PROCESS USING TOTAL QUALITY MANAGEMENT TO ENSURE CUSTOMER SATISFACTION

Housing is one of the basic needs of people who lived all over the communities of the world. In order to fulfil this basic requirement different types of dwelling types have been introduced in the world depending on the cultural, regional, and climatic conditions. Under this various classifications of housing that one of the types called Apartment is a common living arrangement in the world as well as in the commercial and new cultural environment of Sri Lanka. The Sri Lankan apartment building industry has been divided into three main categories of super luxury, luxury, and semi-luxury.

Customer satisfaction is a very essential subject for every business environment everywhere as well as in Sri Lanka. Evolution of quality concept found that Total Quality Management (TQM) is one of the most developed quality concepts and is directly engaged with customer satisfaction. The aim of this research was therefore to investigate how to enhance the customer satisfaction of Sri Lankan semi-luxury apartment buildings by using the TQM concept. The literature review was conducted to review and identify the TQM concept, history of TQM, the definition of TQM and principles of TQM. A review of the literature found that there are 25 main factors and associate sub-factors of TQM that can affect customer satisfaction in the global construction Industry. According to the research aim observed, the necessity of further investigation of TQM implementation in Sri Lankan semi-luxury apartments is important. Preliminary interviews and questionnaire surveys were used as data collection techniques among the selected samples of contractors and consultant organizations in Sri Lanka. The results of questionnaire surveys were evaluated under the RII technique of data analysis.

As a result of the above data analysis and research, findings that identify 20 main factors and therein-related sub-factors, which are, affected customer satisfaction in semi-luxury apartment buildings in Sri Lanka. According to that, some of the main factors develop a process approach towards TQM, management commitment and leadership for TQM, development Education and Training, and development teams. Furthermore, under the same chapter, those main factors are categorized on a priority basis of two parameters of importance level and current practice performance level as per the RII results. According to the research findings, 20 main factors and therein sub factors identified as important to implement in aforesaid organizations to ensure customer satisfaction.

Finally, this research introduces a guideline that is to be implemented in the semi-luxury apartment construction industry to ensure customer satisfaction and it is advised and recommended to follow contractor or consultant organizations who are attached to the Sri Lankan Construction industry. Next, before the final, this research opens up the path to further research approach towards investigating the external customers' perspective on factors affecting customer satisfaction in apartment buildings and how to use TQM to enhance customer satisfaction in the new normal condition in apartment buildings.

Key Words: *Construction industry, customer satisfaction, Semi-luxury apartments, TQM.*

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LIST OF ABBREVIATIONS

ASCE	American Society of Civil Engineers
CMA	Condominium Management Authority
CRHF	City of Richmond Hot Facts
GDP	Gross Domestic Production
ISO	International Organization for Standardization
JUSE	Japanese Union of Scientists and Engineers
KICEM	Korea Institute of Construction Engineering and Management
OCSAT	Online Customer Satisfaction Assessment Tool
OECD	Organisation for Economic Co-operation and Development
PDCA	Plan, Do, Check, Action
PPE	Personal Protective Equipment
QC	Quality Control
QFD	Quality Function Deployment
QS	Quantity Surveyor
R&D	Research and Development
RII	Relative Importance Index
SPC	Statistical Process Control
SQC	Statistical Quality Control
TQM	Total Quality Management
TSM	Total Safety Management
US	United States
USA	United States of America

CHAPTER 1

1.0 INTRODUCTION

1.1 Background

“Housing is the second most important human need, as well as a considerable national asset” (Lepkova, Butkiene & Belej, 2016, p.58). A house provides support for human activities, which are necessary to fulfil the fundamental needs and wants of humans (Mensah, 2013). Prathapasinghe, Perera, and Ariyawansa (2018) stated that the Sri Lankan residential real estate sector has played an important role in the country's growth, and it includes the different types of properties such as single houses, stories houses, annexes, twin houses, line houses, condos/apartments units and so on. According to Prathapasinghe et al. (2018), the condominium development initiative in Sri Lanka goes back to the 1950s. “Depending on the level of these facilities developers categorise condominiums into three major categories; namely, super luxury, luxury and semi-luxury” (Senaratne et al., 2006, p.25). According to Silva and Fernando (2016), there has been an upsurge in the number of property developers, especially in the city of Colombo, and its suburban areas during the past two decades.

According to Shebob, Shah and Mhalas (2013), customer satisfaction and customer relationship are crucial aspects in any enterprise including housing construction projects. Similarly, Ghaleb, Sweis, Imam, Kassab and Rateb (2013) pointed out that “customer satisfaction is critical in all industrial sectors”, and “customer satisfaction with apartment buildings may have implications that transcend those experienced with standard consumer products”.

Furthermore, Lepkoya et al. (2016) pointed out collaborating with customers is very important, because customers are keen to pay more to companies that practice continuous quality control. Shebob, Shah, and Mhalas (2013) argued that “the construction industries/housing developers need to continuously improve their products and services to meet customers’ satisfaction desires and to remain in the current competitive market”. Same way Shebob et al. (2013) reported that “most

customers want higher service quality, but at the same time they want the lowest price”.

Patil, Supriya, and Kulkarni (2017) stated that Indian construction companies are of the opinion that implementing Total Quality Management (TQM) is just compliance with quality assurance and the “scope and reach of TQM” are not appreciated. Furthermore, Patil et al. (2017) expressed that implementation of TQM in the construction industry is at the development level and is mostly limited to corporate construction firms. Patil et al. (2017) contended the main principles of TQM are customer satisfaction and continuous improvement, and those are very important. Similarly, Pheng and Tao (as cited in Shofoluwe, Boadu, Waller, & Bock-Hyeng, 2012) reported, that successful implementation of TQM has resulted in a “reduction in quality costs, better employee job satisfaction, quality work performance, close relationship with subcontractors and suppliers, customer involvement and satisfaction, and employee involvement and empowerment”. Elghamrawy and Shibayama (as cited in Shofoluwe et al., 2012) reported that the implementation of TQM in the construction industry has resulted in “higher customer satisfaction, improved quality products, and higher market share”. In addition to the above, Harrington, Voehl and Wiggin (2012) indicated that achieving customer satisfaction is the main objective of the TQM, whether that customer is internal (internal person in the construction organization) or external (product user).

1.2 Problem Statement

Obtaining customer satisfaction is the ultimate intended purpose of any industry, which is connected to the business environment. Gunduz and Gunduz (2017) stated that customer satisfaction is an essential weapon for companies to hold their position in competitive market conditions. According to Sadik (2018), TQM of an organization will result in customer satisfaction. Gunduz and Gunduz (2017) further explained that meeting customer demands and expectations is an important reason for firms to perform TQM practices. Various studies have been carried out in different sectors such as the automotive industry (Nicoleta, 2010), public universities in Malaysia (Idris, 2015), health care institutions in Libya (Halis et al., 2017), textile and apparel industry in Turkey (Gunduz and Gunduz, 2017), U.S transit industry

(Andrle, 1994), construction industry (Ahmad, 2018) and wildlife service's (Sharon and Okibo, 2012) investigating the applications of TQM.

Arditi and Gunaydin (1997) stated that construction projects should be considered as a process where all customers must be satisfied. Malik, Banerjee, and Ahmad (2018) concluded that the "adoption of TQM by construction companies will result in higher customer satisfaction, better quality product and higher market share and stakeholder satisfaction".

When considering the Sri Lankan context, Prathapasinghe, Perera, and Ariyawansa, (2018) contended that, policymakers, industry specialists, academics, professionals and others who are interested and responsible to ensure the quality, sustainable development and performance in the Sri Lankan condominium industry. Perera (2011) stated that the improvements in customer satisfaction in the semi-luxury residential industry pointed toward quality and property management attributes. Finally, Perera (2011) strongly stated that further research needs to "investigate the contractor's awareness of quality management systems like TQM, ISO 9000, and QFD" for customer satisfaction.

Ariyawansa and Perera (2018) stated that the semi-luxury apartment is the most popular living facility model in Sri Lankan families due to the employment opportunities and achieving of their children's higher education goals. Karunanayake and Wickramasinge (2018) indicated that Sri Lankan apartment buildings provide a considerable amount of contribution to the national economy. Therefore, to maintain and increase that, it is necessary to identify innovations and improvements to develop the apartment business. Therefore, customer willingness, as well as customer satisfaction, needs to be retained and improved in a higher manner in this business sector. However, it is strongly observed that a knowledge gap exists regarding proper guidelines for the adaption of TQM in Sri Lankan apartment buildings for the direction toward customer satisfaction. In order to address this, there should be a proper guideline to drive toward enhancing the quality of the semi-luxury apartment construction process using TQM to ensure customer satisfaction.

1.3 Aim

Investigate how to enhance the quality of the semi-luxury apartment construction process using TQM to ensure customer satisfaction.

1.4 Objectives

To achieve the above aim of this research, the following objectives are formulated.

- Review the Sri Lankan apartment industry, and its commercial classification.
- Review and identify the concepts of quality, TQM and the principles of TQM.
- Identify the level of importance of TQM's main factors that enhance the quality of the semi-luxury apartment construction process to ensure customer satisfaction.
- Identify the level of the present practice of TQM's main factors that enhance the quality of the semi-luxury apartment construction process to ensure customer satisfaction.
- Develop a guideline to enhance the quality of the semi-luxury apartment construction process using TQM to ensure customer satisfaction.

1.5 Research Methodology

To achieve the research aim through the given objectives, the following research methodology implemented throughout this dissertation was mentioned in Chapter 3. This research methodology contains research design, process, approach, and strategy. Moreover, this research has been conducted under the *mixed method* of the research approach.

- **Literature review**

To accomplish the review of other authors' documents related to the given topic of this research, electronic documents of Journals, books, conference papers, research papers, reports and magazine articles were mostly referred through the internet sources of www.Google.com, www.scholar.google.com, www.lib.mrt.ac.lk, [https://sci-hub.tw/](http://sci-hub.tw/) and therein other branches of websites.

- **Conduct preliminary interviews**

In these preliminary interviews, the following category of stakeholders is represented to cover the selected sample.

- ✓ Project managers in the Sri Lankan apartment construction industry
- ✓ Resident engineers in the Sri Lankan apartment construction industry
- ✓ Contract managers in the Sri Lankan apartment construction industry

This is the primary source of the data collection method under the qualitative research methodology and three interviewers responded out of five invitations. The purpose of conducting these preliminary interviews is to verify and confirm the literature findings which are related to the research objectives where mentioned in the sub chapter 1.4. These preliminary interviews were conducted under the well-structured type of interview forms.

- **Questionnaire survey**

A questionnaire survey is a secondary data collection method in this research and sample selection was conducted convenient sampling method from who are representing the whole population of the stakeholders of apartment construction buildings in Sri Lanka, subject to the given scope and limitations.

In this survey, the following category of sample is selected to cover the total population of apartment industry stakeholders in Sri Lanka.

- ✓ Contractor organizations in the Sri Lankan apartment construction industry – 18 no's of responses out of 20 no's issued.
- ✓ Consultant organizations in the Sri Lankan apartment construction industry – 14 no's of responses out of 20 no's issued.

The purpose of this questionnaire survey is to collect the data, which is required to calculate RII values for ranking the main factors of research objectives. Under a questionnaire survey, well-designed separate questionnaire survey papers are distributed among the above-mentioned sample population to receive their response from them.

- **Analysis methods**

Analysis of qualitative data from preliminary interviews was followed by manual content analysis. Similarly, the quantitative research methodology in this research followed the Relevant Important Index (RII) method to analyse the data collection to achieve the research aim through its objectives.

1.6 Scope and Limitations

Due to the magnitude of the research subject, the complexity of the internal and external customer population and the wide range of development diffusion of Sri Lankan apartment construction buildings, this research were conducted under the selected specific metropolitan area of Colombo, the sub-urban area of Malabe area and Galle municipality area of Sri Lanka. Because, those above-mentioned areas are the most recently developing regions of the apartment industry in Sri Lanka, where compare with other areas. In addition to the above, this research has been limited to covering the semi-luxury apartments in the private sector, and it was not have represented the low income or middle-income apartments as well as the super-luxury apartments in the private or government sector. According to Perera (2011) stated, limitations were provided more convenience to further narrow down the research topic and match with the research gap.

1.7 Chapter Breakdown

This research will follow the following chapter breakdown to properly conduct, guide, and present the research as planned.

Chapter 1 – Introduction

Express the general background of the research topic, and research problem statement, and talk about the research gap, aim, objectives, research methodology, scope, limitation, and chapter breakdown.

Chapter 2 – Literature review

The literature review provides that, broad and theoretical foundation for the aim of the research. Furthermore, this chapter allows comparing and contrasting the aim and objectives of this research with other researches findings. In addition to the above, this

literature review discussed the main factors and therein subs factors of research objectives.

Chapter 3 – Research methodology

Taking into consideration, the importance of this study and elaborately explain the research approach and sampling methods. Clarify the research settings, research design, and method of data analysis.

Chapter 4 – Data analysis and research findings

Stabilize the research findings and conduct a discussion by comparing other researches findings.

Chapter 5 – Conclusions and recommendations

Summarize the research and publish the result of the research. Provide recommendations to research problems and open up the path to further researches opportunities.

CHAPTER 2

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter gives a comprehensive review of literature related to customer satisfaction, apartment building, the construction industry, quality concepts, and Total Quality Management (TQM). Furthermore, this chapter provides an in-depth review of the historical layer, various applications of TQM in different industries and barriers to implementation of TQM towards customer satisfaction. Finally, the end of this chapter expresses the finding related to customer satisfaction in the apartment building and investigates the adoption of the TQM concept in the apartment buildings to bridge the research gap, which is given in chapter 1.

2.2 Housing as a Basic Human Need

Humans require physical needs of food, water, air, safety, shelter, warmth, health, and sex for their survival (Frey & Wilhite, 2005, NASA & Jamestown Education Module, 2006) and Mensah, 2013). In addition to the above, Zainudeen, Senaratna, Jayasena and Rameezdeen (2006) stated that shelter is a primary need of mankind. Moreover, Mensah (2013) confirmed that a house falls in the category of shelter. “The house is such a universal satisfier for human needs that in general discourse people tend to speak of the need for housing” (Murry, Pauw & Holm, 2016).

Therefore, concerning the above author’s findings and conclusions, that housing is one of the major needs of people all over the world to survive and it is a fundamental and essential requirement.

2.3 Classification of Housing

Koltai (2017) stated that there are many types of buildings people from all over the world sleep in every night. And Koltai (2017) contended that there are 31 house types from all over the world, including apartment, bungalow, caravan, castle, condos, cottage, dorm, duplex, farmhouse, flat, hotel, houseboat, hut, Igloo, lighthouse, lodge, log cabin, manor, mansion, motel, place, semi-detached house, shack, single-family house, skyscraper, tepee, tent, terraced house, townhouse, trailer and treehouse.

Kulu and Vikat (2007) distinguish housing categories as single-family houses, terraced houses and apartments.

According to the City of Richmond Hot Facts (CRHF, 2018), the research found several house types. CRHF (2018) contended those are Single detached houses, townhouses, garden houses, row houses and apartments. CRHF (2018) further stated that an apartment is one of two dwellings located one above the other, and may or may not be attached to another dwelling or building. CRHF (2018) noticed that some dwellings which have units of five or more storeys in a high-rise building are called apartment buildings.

2.3.1 Definition of apartment and condominium

Apartments are “housing units in a dwelling that have three or more residential units, with at least one unit being on top of another” (Kulu & Vikat, 2007, p.780). Koltai (2017) stated that “an apartment is an American term for a home where you live”, the same way British English says a flat is a separate home within a large building where others also have their own home. According to the Siniti (as cited in Senaratne, Zainudeen, and Weddikkara, 2006) “condominium is a western lifestyle of living, brought into urban areas of eastern countries due to the lack of serviced land and increasing population density”. Kowshala (as cited in Senaratne et al., 2006) pointed out that, the condominium is termed as a building or structure of two or more units, including the interior space of each unit is individually owned and the balance of the common property is owned in common by the owners of individual units. Similarly, Senaratne et al., (2006) argue that the term a condominium is a form of homeownership in which individual units of a large building complex are sole or rented. The same authors further explained that these types of units might be renovated apartments, townhouses or even commercial warehouses.

Franklin (2019) and Gregory (2019) explain that structures of apartment and condo communities are similar, and they often have comparable amenities like swimming pools, trash disposal, manicured green spaces, on-property gymnasium and more. Franklin (2019) and Gregory (2019) further discussed that the main difference between apartments and condos is ownership an apartment is defined as a residence

that is rented and condos are owned property instead of rented as a part of a large residential building.

In Sri Lankan contexts both names are used for the same purpose of owning property under the one large residential building with specific amenities like swimming pools, lift, gymnasium, trash disposal, parking facility, central security and other facilities subjected to the one condominium law of Sri Lanka.

2.3.2 Characteristics of apartments

Mridha (2015) reported that the concept of living in multi-storied apartment buildings arose, because of, the considerable annual increase in population and its subsequent demand for housing and good design solution for urban housing. Further to Mridha (2015), “it is a new experience for many people thus changing the urban and social fabric from the classic single stride independent house to sharing smaller units of space side-by-side with numerous other families”. Ndegwa (2018) argued that determinants comprise apartment features including proximity to shopping malls, central business district, schools, adjacent to the swimming pool, including balconies. In addition, Miller and Heights (2009) found a system of space including a resident apartment unit in a multi-unit building arranged on multiple levels that include a central corridor, and a variety of ceiling heights, each appropriate to the function and formality of its respective space. Mridha (2015) further contended that generally, apartment dwellers access their respective units through a central core where services are located. In addition to the above Mridha (2015) stated, that it is also a characteristic feature of most apartment buildings and equipped with lifts and electricity generators.

2.4 Apartments in Sri Lanka

2.4.1 Evolution of the Sri Lankan apartment industry

Prathapasinghe, Perera and Ariyawansa (2018) during the period in-between 1960 to 1970 the government of Sri Lanka initiated housing apartment projects as a strategic measure to resolve the burning issue of demand for housing for low and middle-income communities in Colombo where lands are limited in supply. Prathapasinghe

et al., (2018) further pointed out that, during the last few decades, these types of properties like apartments; flats and high rise housing solutions have been developed under different projects at different scales. “There was a boom period for the property development sector in Colombo” (Silva & Fernando, 2016, p.911). There have been a rapidly increasing number of property developers, especially in the city of Colombo, and its suburban areas that are either public or private companies, limited partnerships or individuals (Silva and Fernando, 2016).

According to the above authors finding that, the evolution of the Sri Lankan Apartment Industry started in 1960 and it was creating new demand in the apartment industry in Sri Lanka.

2.4.2 Demand for the Sri Lankan apartment industry

According to the research by Senaratne et al., (2006), scarcity of land availability in the Colombo metropolitan region and the convenience of buying an apartment, there is a significant demand for apartments in Sri Lanka. “The skylines in the major cities of Sri Lanka are fast changing with many apartment buildings being constructed” (Balasuriya, Bandara, Ekanayake & Jayasinghe, 2007, p.22). The same authors further stated that high rise apartment buildings are in demand. Similar to the above De Silva and Ranasinghe (2010) research found that land is scarce in Colombo city, and proposed that concept of the apartment may be an ideal solution for the same.

With reference to the annual report of the Central Bank of Sri Lanka (2008), the demand for houses and urban infrastructure continuously increases with the growing population and the economic growth of Sri Lanka. Hewamanne (as cited in De Silva and Ranasinghe, 2010) established that “it was estimated that the annual demand for houses in Sri Lanka is 80,000 – 100,000 units”. Jones Lang LaSalle (as cited in Anthonisz and Perry, 2015) pointed out that, the end of the 30 years of war in 2009 brought new hope for the industry in anticipation of high economic growth and a higher demand for land and property.

Ariyawansa and Perera (2018) described that Sri Lankan families who are motivated by children’s education goals, tend to migrate to Colombo suburbs from remote areas of the country. Ariyawansa and Perera (2018) further stated as a result of that, they

are looking for lower and middle range temporary accommodation (semi-luxury apartment) facilities to stay in.

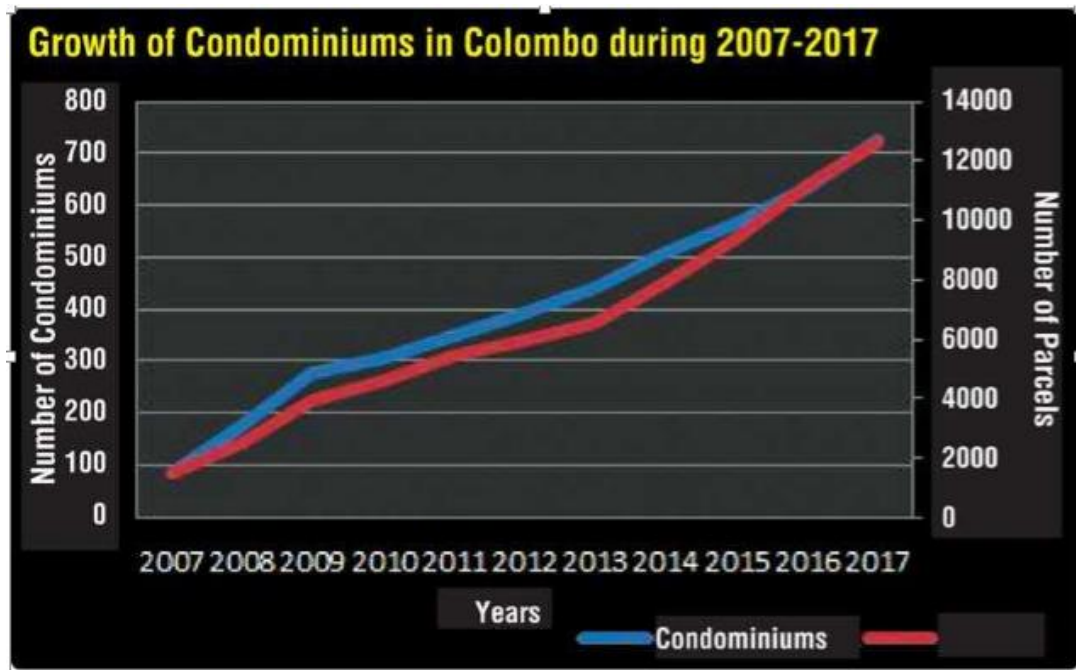


Figure 2.1: Rate of growth – Condominium projects in Sri Lanka

Source: Karunanayake and Wickramasinge (2018)

In addition to the above, Figure 2.1 explained the past growth rate of Condominium Projects in Sri Lanka as recorded in 2018. Karunanayake and Wickramasinge (2018) pointed out that, as per the condominium management authority (CMA) there are a considerable increase growth in the condominium construction rate, during the past decade nearly 34%, while it has increased by an unprecedented 64% in 2017 along, compared to 2016. In addition to the above, Prathapasinghe et al., (2018) argue with their research finding and stated, there was a gradual increase over the 2012-2017, period, and because in that period there are 895 numbers of certified completed properties and 15,483 numbers of condominium units in the bulk as at 2017. Prathapasinghe et al., (2018) further stated, as a result of that, there are a growing supply and effective demand in the condominium market over the past years in Sri Lanka.

According to the above circumstances, demand for apartments is more important for Colombo and therein suburbs of Sri Lanka. Therefore, the development of the Sri

Lankan apartment industry is very essential for fulfilling the basic wants of the people of Sri Lanka.

2.4.3 Classification of apartments in Sri Lanka

Prathapasinghe et al., (2018) stated, that with the establishment of the Condominium Management Authority in Sri Lanka in 2005 under Act No. 24 of 2003, it become the main agency that governs the condominium properties. Meanwhile, Karunanayake and Wickramasinge (2018) researched and classified that, the Sri Lankan condominium market into the main three types of condominiums super-luxury, luxury and semi-luxury. After that, Ariyawansa and Perera (2018) found, in Colombo reign, the primary housing market is active for luxury and super luxury houses and there the condominium sector is a highly developing sector for Semi Luxury, luxury and super luxury houses. As well as the research by Senaratne et al., (2006) proved that, the types of apartments available in Sri Lanka are mainly categorised as a super luxury, luxury and semi-luxury depending on facilities provided by developers such as swimming pools, gymnasiums, restaurants, finishes, bathroom fittings, floor tiles, wall tiles, floor and wall finishes and electrical accessories. Furthermore, Propwise (as cited in Anthonisz and Perry, 2015) noticed that several characteristics can define a Sri Lankan luxury condominium such as location, price, size, finishers, neighbouring homes, surrounding amenities, and interior finishers and security service. In addition to the above Senaratne et al., (2006) pointed out, that it was identified that the new trend is for super-luxury apartments whereas previously, it was for the semi-luxury apartments. Table 2.1 presents Sri Lankan apartment types and there in related facilities as follows.

Table 2.1: Classification of Sri Lankan condominium types and related facilities

No.	Facilities	Super Luxury	Luxury	Semi Luxury
1	24 hours security	✓	✓	✓
2	CCTV & intercom system with the	✓	✓	✓
3	FIRE protection & detection	✓	✓	✓
4	Garbage disposal system	✓	✓	✓

5	Elevators	✓	✓	✓
6	Hot water geysers	✓	✓	✓
7	MATV connection	✓	✓	✓
8	Children Play area	✓	✓	✓
9	Vehicle park	✓	✓	✓
10	Private Balconies	✓	✓	✓
11	Air-conditioned Apartment blocks	✓	✓	
12	Swimming pool	✓	✓	
13	Restaurant and Bar	✓	✓	
14	Gymnasium	✓	✓	
15	Laundry	✓	✓	
16	Central gas supply system	✓	✓	
17	Children's pool	✓		
18	Game rooms	✓		
19	Convenience stores	✓		
20	Video centre	✓		
21	Changing and meal room for	✓		
22	Walking track	✓		
23	Squash court	✓		
24	Salon	✓		
25	Sauna	✓		
26	Standby generator	✓		
27	Service elevators	✓		
28	Three-tier security system	✓		

(Source: Senaratne, Zainudeen, and Weddikkara, 2006)

Table 2.1 explain how categorised the apartments with relation to the facilities provided. It was depending on the most valuable and convenient facilities offered by the developer. However, the above-said amenities related to the apartment classification could be varied depending on the apartment unit prices, location of apartments and target market of the customer segmentation.

2.5 Introduction of Customer

According to Kujala, (as cited in Lepkova, Butkiene and Belej, 2016) “a customer is defined as a person who pays for a product or service and generally dictates the requirements”. On the other hand, Leonard, Lewis, Stephan and Haeckel (2002) stated that the customer always has “an experience of good, bad or indifferent whenever they purchase a product or service from a company”. In addition to that, Juran (as cited in Haron, 2012) argues that customers are considered to be impacted by a product. Moreover, Juran and Abdul-Rahman (as cited in Haron, 2012) and Arditi and Gunaydin (1997) have stated that, in general, customers are divided into the vital few external customers (owner, designer, contractor, etc.) and internal customers (employees, units, departments within an organization). Juran (as cited in Pereira and De Silva, 2003) emphasized that the internal customers are those who work to ensure the satisfaction of external customers.

2.6 Customer Satisfaction

2.6.1 What is customer satisfaction?

According to Haron (2012), customer satisfaction or dissatisfaction is a core concept in marketing. Similarly, Rust and Zahorik (1993) also found that the value of customer satisfaction rests on its relationship to choice and market share. Furthermore, Haron (2012) stated that it is determined based on the overall feeling or attitude of a person about a product or service after it is purchased or experienced. In addition to the above Bolton, Bramlett and Hoekstra (as cited in Eugene, Anderson, Fornell, & Maxvancheryl, 2004) argued that “customer satisfaction should lead customers to purchase more requirements from the firm”. According to Dubrovski (as cited in Harson, 2012), customer satisfaction is the “most efficient and least expensive source of market communication” because satisfied customers will “disseminate their favourable experiences to others”.

“Customer satisfaction is defined as an overall evaluation based on the total purchase and consumption experience” with the goods or service over a period (Fornell, Johnson, Anderson, Cha and Bryant as cited in Khadka, & Maharjan, 2017). According to Koskela (as cited in Lepkova et al., 2016) customer satisfaction is

“defined as personal satisfaction or disappointment” caused by the difference between “the received product or service and the customer’s expectations”. Further, Lepkova, Butkiene and Belej (2016) mentioned “customer satisfaction is a function of perceivable quality and unfulfilled expectations it illustrates the scope of discrepancies between quality and expectations”. Lepkova et al. (2016) further contended that particular customers compare the expected product or service with certain specifications and standards.

Figure 2.2 shows how customer satisfaction deviates from negative to positive due to fulfilling their wants rather than the basic needs and how then customers be delighted.

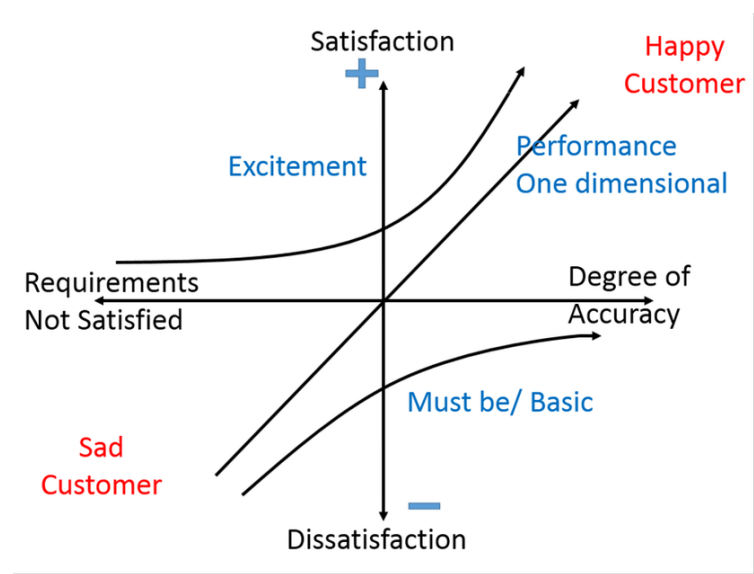


Figure 2.2: Customer satisfaction behaviour

Source: Solanki and Desai (2017)

Gustafsson et al. (2004) further explained that overall satisfaction has a strong positive effect on customer loyalty intention across a wide range of product and service categories.

2.7 Importance of Customer Satisfaction in the Construction Industry

“Customer satisfaction has become one of the key issues for companies in their efforts to improve quality in the competitive marketplace” (Shebob, Shah & Mhalas, 2013, p.26). Shebob, Shah and Mhalas (2013) further stated that it can be realised as

either a goal or a measurement tool in the development quality in the construction industry. Similarly, Lepkova et al. (2016) and Karna, Sorvala and Junnonen (2009) stated that enhancing customer satisfaction and quality as a major challenge for the construction industry. According to Xiao and Proverbs (as cited in Karna et al., 2009) “improved contractor performance leads to increased customer satisfaction and improvement in the reputation of contractors and, hence, their competitiveness in the market”. Furthermore, Karna, Junnonen and Kankainen (2004) stated, that customer satisfaction is an important factor in the development of the construction process and customer relationships. Karna et al., (2004) further contended that “customer satisfaction enables construction companies to differentiate themselves from their competitors and create sustainable advantage”.

According to Lepkova et al., (2016), “quality in construction is often defined as the quality that meets certain requirements and quality expressed through customer satisfaction”. Figure 2.3 broadly explains the process of generating customer satisfaction related to the construction industry.

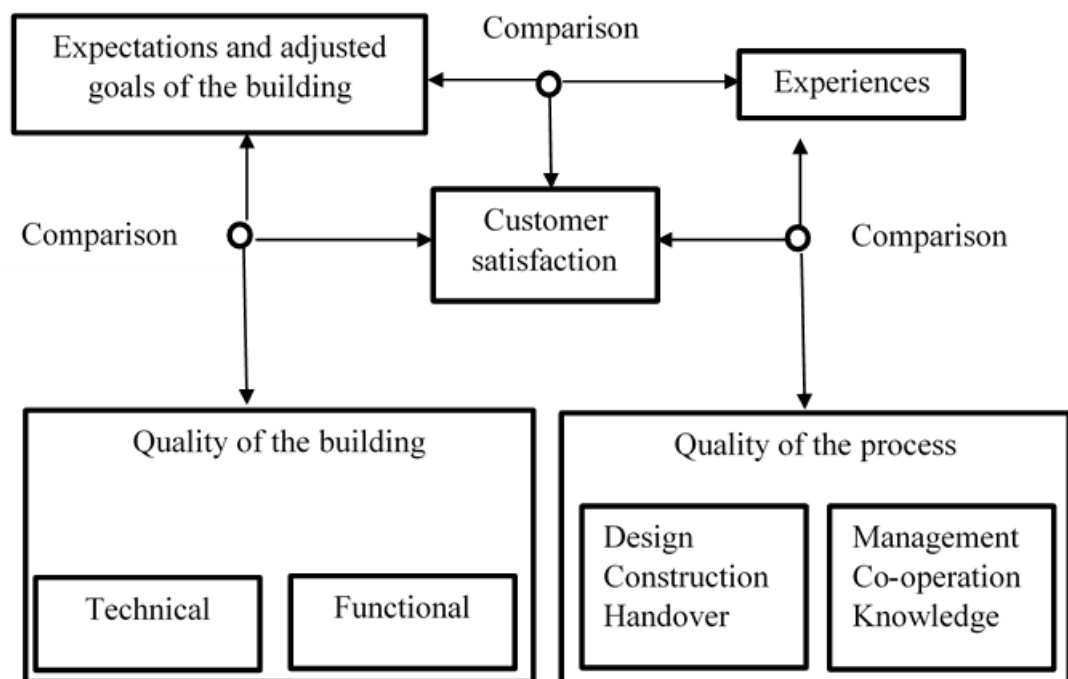


Figure 2.3: Interrelationships between customer satisfaction and quality

Source: Karna (2004)

According to Figure 2.3, key reasons affecting customer satisfaction are the quality of product & process, the experience of the builder and the expectation of the customer. According to the above discussions, it is clear that customer satisfaction is a very important and significant event for the construction industry and it is much crucial factor to maintain and develop their market share in the construction industry.

2.8 Customer Satisfaction in Residential Buildings

According to the sub section 2.7, it was indicated that customer satisfaction is very important and strongly affected by the construction industry in different ways. Apart from that, real estate industries including apartment construction are a very prominent event in the construction in Sri Lanka and other countries and it was directly involved in the economic growth of the countries. Therefore, it is very important to study and investigate the business point of view to enhance the sales of apartments. For that, the following different author's findings were supported to establish the reason for customer satisfaction with apartment buildings.

According to Lepkova et al. (2016), the customer satisfaction of new apartment buildings are relying on the average level of technical and functional quality. Because Lu (as cited in Sweis et al., 2013) argued that, “satisfaction with one’s housing is a vital component of overall life satisfaction”. Similarly, Zainudeen, Senatratna, Jayasena, and Rameezdeen (2006) found that attractive customer satisfaction and saleability are often synonymous in the housing market.

2.8.1 Quality factors affecting customer satisfaction in apartment buildings

Yim, Lee, HyungKim and JunKim (2011) found that identified precedent factors to determine housing satisfaction on the quality of apartment houses are affected by five factors such as household satisfaction, building satisfaction, environmental satisfaction, social satisfaction and relationship satisfaction. In addition to the above, Haron (2012) also found that support the above through his findings, the important criteria that would satisfy the customer of high-rise buildings including apartment units contains functionality, quality of materials and quality of accessories where used in the particular buildings.

In addition to the above, the literature review found that customer satisfaction in apartment buildings depends on several factors as classified in Table 2.2.

Table 2.2: Quality factors affecting customer satisfaction in apartment buildings

No.	Factor	A1	A2	A3	A4	A5	A6	A7	A8
1	Technical quality	✓		✓				✓	
2	Functional quality	✓		✓	✓			✓	✓
3	Service quality				✓	✓	✓		
4	Material quality								✓
5	Sociology condition		✓		✓			✓	
6	Psychology condition		✓		✓				
7	Planning & Design	✓	✓	✓	✓	✓	✓	✓	
8	Civil engineering		✓		✓	✓	✓	✓	
9	Marketing Aspects		✓						
10	Geography Status		✓	✓	✓			✓	
11	Saleability ability			✓					
12	Offering Services			✓					
13	Price attractiveness			✓				✓	
14	Flexible payment system			✓					
15	Developer experience			✓					
16	Legal aspects							✓	

Legend

- Lepkova et al. (2016) - A1
- Sweis et al. (2013) - A2
- Zainudeen et al. (2006) - A3
- Kahraman (2013) - A4
- Yang and Peng, (2016) - A5
- Karna et al. (2009) - A6
- Shofoluwe et al. (2012) - A7
- Haron (2012) - A8

According to Table 2.2, the term quality is prominently highlighted in every authors finding and recommendation to achieve customer satisfaction in apartment buildings. As a result of that, it was directed to study and investigate the quality. Therefore, hereafter this literature review will have more focused on the concept of quality and its related principles with therein categories.

2.9 The Concept of Quality

2.9.1 Definition of quality

According to Correia (2011), there is no universal definition for quality, rather different definitions are appropriate under different circumstances. Chandrupatle (2009) and Hellman and Liu (2013) supported the above and stated, that there are many definitions of quality available in the literature, due to quality is perceived differently by different people.

Lepkova et al. (2016) found that meeting the given specification gains the degree up to any product or service without faults. Lepkova et al. (2016) more precisely defined the quality needs to meet and exceed customer needs and requirements. In addition to the above, Deming (as cited in Correia, 2011) defines quality as continuous improvement through reduced variation. In other words, “good quality means a predictable degree of uniformity and dependability” with some quality standards to the customer (Chandrupatle, 2009). Moreover, Suarez (1992) says that “quality is a relative term that will change in meaning depending on customers' needs”. According to Crosby (as cited in Suarez, 1992, Hellman and Liu, 2013, Chandrupatle, 2009 and Correia, 2011) quality is conformance to requirement. Correia (2011) further mentioned that; the “quality can never make sense unless it is based on what consumers want”. Similarly, Juran (as cited in Suarez, 1992, Hellman and Liu, 2013, Chandrupatle, 2009 Correia, 2011) defines quality as fitness for use. Additionally, Shewhart (as cited in Hellman and Liu, 2013) defines quality as the goodness of products and services.

2.9.2 Evolution of quality concepts

According to Hellman and Liu (2013), quality is not an innovation in mankind's history. Hellman and Liu (2013) further contended that the origin of quality dates back to ancient Egyptian history. Parallel to the above, Bergquist, Garvare and Klefsjo (2013) contended that the "quality movement has a long and complex history and not surprisingly its evolution from the industrial revolution to the present day has been interpreted in several different ways". On the other hand, Correia (2011) found that quality concerns have now become a strategic concern "with mass industrial production and increasing competitiveness". Concerning Dale and Plunkett (as cited in Correia, 2011) publish that, "the development of quality management is usually defined in four stages and firstly, focused on Quality Inspection, following of the Quality Control, Quality Assurance finally, Total Quality Management (TQM)". Contrary to the above, Power (2013) has presented six evolution stages of quality instead of four (refer to Table 2.3).

Table 2.3: Different perspectives of quality evolution

Nr	1	2	3	4	5	6
	Mass Inspection	Quality Control	Quality Assurance	Total Quality Control	Company-wide Quality Control	Total Quality Management
i.	Inspection	Quality Manuals	Emphasis on prevention	All aspects of quality of inputs	R & D	Measured in all aspects of business
ii.	Salvaging	Product testing using SQC	Proactive approach using SPC	Testing equipment	Design	Top management commitment
iii.	Sorting	Basic quality planning	Advance quality planning	Control on processes	Engineering	Continuous improvement
iv.	Grading	-	-	-	Purchasing	Involvement & participation of employees

v.	Rectifying	-	-	-	Operations etc.	-
vi.	Rejecting	-	-	-	-	-

Source: Power (2013)

As briefly explained by Bergquist et al. (2013), Quality Inspection focuses on adopting inspection to discover poor quality products. These can then be discarded, reworked or sold as lower quality products.

Bergquist et al. (2013) further contended that statistical Quality Control was being adapted to the manufacturing industry to “identify problems earlier and control the manufacturing process instead of rejecting or repairing afterwards”. According to Hellman and Liu (2013), Quality Control was the leading quality management system adopted in the early 20th century.

Quality Assurance on the other hand, “focuses on pre-production activities” (Bergquist et al., 2013). It “relies on quality standards or instructions to assist with the reduction of the risk of failures and mistakes in the processes used to produce a product or service” (Bergquist et al., 2013).

Finally, Bergquist et al. (2013) has concluded TQM as the fourth and present stage of the quality evolution process, which involves “understanding and implementing quality management principles and concepts in every aspect of an organization, including its customers and suppliers”. According to Hellman and Liu (2013), in the 1980s, TQM was the dominating quality management system due to the quality thinking pattern that moved from manufacturing and product-based towards organization-wide performance excellence.

According to the above findings, the evolution of quality management could be classified as starting with Quality Inspection, next to Quality Control, and next Quality Assurance, finally it was reached the Total Quality Management. Additionally, Figure 2.4 illustrates that evolution steps in graphically.

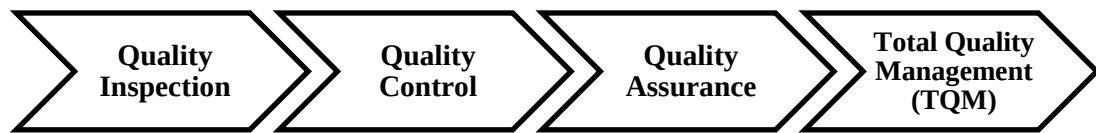


Figure 2.4: The four stages of quality evolution

In accordance with the above authors' findings related to the quality concepts, there are various basic characteristics different to each other. Following Table 2.4 briefly explains those basic characteristics for easy and successful understanding.

Table 2.4: Basic characteristics of four quality principles

Basic Characteristics	Quality Inspection	Quality Control	Quality Assurance	Total Quality Management
Main interest	Checking	Control	Coordination	Strategic impact
Vision of quality	A problem to be solved	A problem to be solved	A problem to be solved, but that is proactively addressed to	An opportunity to vary the competition
Focus	Uniformity Product	Product uniformity under inspection	The whole chain of manufacturing, from design to the market, and the contribution of all groups to prevent functional failures in quality	Market and client needs
Methods	Instruments Measurement	Tools and Techniques Statistics	Programs and systems	Strategic planning, goal setting and mobilization of the organization
Role of professionals' quality	Inspection, classification, counting, assessment and repair	Troubleshooting and the application of statistical methods	Planning, Measurement and Quality program development	Setting goals, education and training, consulting other departments

				and development programs
Who is responsible for the quality	The Inspection Department	Departments Manufacturing And Engineering	All departments, with high administration engaging surface with planning, and implementation of guidelines Quality	Everyone in the the company, with top administration exercising strong leadership
Orientation and focus	Inspect quality	Quality control	Build quality	Manage quality
Period	1940s	1950s	1960s	1970s

Source: Correia (2011)

Table 2.4 highlights that Total Quality Management is one of the most developed quality concepts out of the other four concepts. Therefore, the next sub chapter broadly discusses Total Quality Management.

2.10 Total Quality Management

Panuwatwanich and Nguyen (2017) stated that “over the last few decades, Total Quality Management has been applied to many organisations as a tool to improve quality and corporate performance”. Similar to the above, Burati, Matthews and Kalidindi (1991) stated that TQM is a company-wide effort that involves everyone in an organisation to improve performance. Similarly, Harel, Gupta, Shitole, Nankar and Shelake (2016) state that, “TQM is the integration of all functions and processes within the organisation in order to achieve continuous improvement of the quality of goods and services”. In the same line, Neyestani and Juanzon (2016) also contended that TQM is a management philosophy that emphasizes non-stop quality improvement within all the aspects of the organization.

Considering the all above authors’ introduction of the TQM, it is very important to study on behalf of the development of the organization.

2.10.1 Definition of total quality management

Both academics and practitioners are considered and defined TQM as a management approach that improves the products and services quality continuously throughout the production process for satisfying customers (Behnam & Juanzon, 2016, Harel et al., 2016, Erande & Pimplikar, 2016, Kakkad & Ahuja, 2014, Bergquist et al., 2013 and Hasan, 2012). Shinde and Pimplikar (2015) define TQM as it is a meeting of internal and external customers' requirements and "the main difference between quality and TQM is that the quality usually focuses on a temporary process while TQM is a long term process and adopts a strategic dimension". Similar to the above, Burati and Oswald (as cited in Pheng & Teo, 2004 and Mohammed, 2016) also termed that, "TQM is a journey, not a destination".

According to the Bergquist, Garvare and Klefsjo (2013) and Ashokkumar (2014) define that, "TQM is a management approach of an organization, centred on quality based on the participation of all its members and aiming at long term success through customer satisfaction, and benefits to all members of the organization and society". Lakhe and Mohanty (1993) contended their definition of TQM as, a continuous quest for excellence by creating the right skills and attitudes in people to make the prevention of defects possible and satisfy customers or users totally at all times. Similarly, recently, Erande and Pimplikar (2016) express the definition of TQM as a standard operating procedure of work for an organization that is documented effectively for guiding the co-ordinated action of people in the best practical way in the quest of achieving the desired policies, customer satisfaction and high marginal profits as well as cost and time effectiveness.

Kakkad and Ahuja (2014) further extend the above and state, TQM is based on the premise that the quality of products and processes is the responsibility of everyone involved with the creation or consumption of the product or services which are offered by an organization, requiring the involvement of management, workforce, suppliers and customers to meet or exceed the customer expectations. Same to the above, Nukulchai contended (as cited in Dulaimy, Alkhazraji, AlHdeethi & Sameer, 2015) that, "TQM is a philosophy that, strengthens and supports the culture to foster

continuous organizational improvement through integrated, systematic, consistent and reliable effort involving everything and everyone, focusing primarily on the total satisfaction of internal and external customers”.

2.10.2 History of total quality management

Lakhe and Mohanty (1994) stated that after World War II until the 1950s, made in Japan was synonymous with poorly-made products. As a result of that, “during the 1950s, the most notable U.S quality experts of Demings and Juran agreed to assist the Japanese in improving the quality of their products and enhance their exports” (Burati et al., 1991). Bergquist et al. (2013) further contended that, as inspired by their ideas, the top management of Japanese organizations extended customized the integrated approach and culture of TQM. Andrie (1994) stated it is commonly believed that TQM is a Japanese management philosophy. Bergquist et al. (2013), stated due to the concept of TQM “Japan's enormous post-war achievements in the quality field put pressure on the western business world to put quality back on the agenda”. Nowadays, the TQM concept and approach are well-understood and widely practised in Europe, North America, Japan and the growing economies of East Asia (Mohammed, 2016).

2.10.3 Total quality management and customer satisfaction

According to Sheikholeslam and Emamian (2015), TQM practices such as product design and customer focus are essential to enhance customer satisfaction. Sadik (2018) also stated that the ultimate aim of TQM is customer satisfaction. BSI and Stevenson (as cited in Amaniampong, Salakpi & Bonye, 2014) contended that among the key principles of TQM is customer focus, thus “customer requirements must be met first time every time”. However, S.H. Chen, Chen and Wu (2014) conclude that TQM is a comprehensive management approach and its main purpose is customer satisfaction by means of continuous improvement.

Figure 2.5 shows how TQM can be performed toward customer satisfaction by means of providing better service to customers.

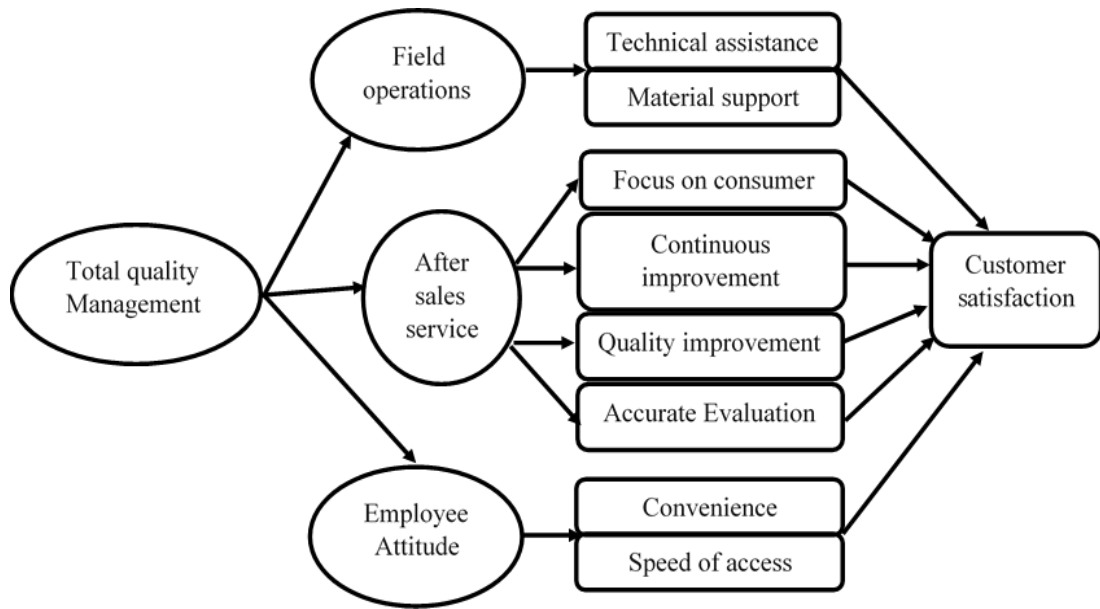


Figure 2.5: How TQM impacts customer satisfaction

Source: Rasheed (2016)

Any business organization's ultimate purpose is to create or increase profits. For that, they were implementing several types of programs, and systems and benchmarking the good practices. Figure 2.6 simply explains how that flowchart works.

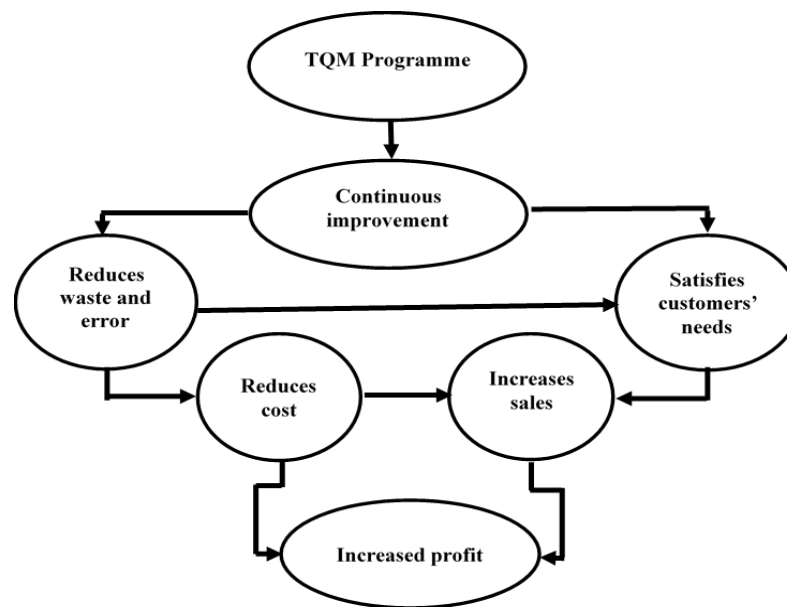


Figure 2.6: Flowchart of TQM for customer satisfaction and creating profits

Source: Nagaprasad & Yogesha (2009)

Nagaprasad and Yogesha (2009) stated that TQM lead to continuous improvement reduces waste and customer satisfaction. Continue the statement by Nagaprasad and Yogesha (2009) and stated, then it will create profits. Differently, Stevens et al. and Legoharel (as cited in Mercy & Taiye 2015) contended customer satisfaction increases then profitability and market share increase and have a good return on investment for the organization.

2.10.4 Principles of total quality management

Metri (2005) has found 10 main factors for construction quality management based on the features of different TQM frameworks. On the other hand, Gherbal et al. (as cited in Neyestani & Juanzon 2016) have identified 7 critical factors for TQM. In addition to the above, Talib, Rahman and Qureshi (2010) have identified a set of 17 TQM practices for the success of the organization. Same as above, there are plenty of authors have investigated and reported their results regarding the principles of TQM in the same meaning but in different ways. Therefore, Table 2.5 these different principles of TQM identified by various authors.

Table 2.5: Basic principles of Total Quality Management

Item No.	Principles of TQM	Details of Authors	No's of Authors
1.	Top Management Commitment	Metri (2005) / Talib et al. (2010) / Erande and Pimplikar (2016) / Iha and Iyer (2006) / Mehmood, Qadeer and Ahmad (2014) / Pankaj, Naman and Kunal (2013)	6/25
2.	Customer Focus / Satisfaction	Metri (2005) / Gherbal et al. (2012) / Neyestani and Juanzon (2016) / Talib et al. (2010) / Yousif, Najm and Al-Ensour (2017) / Bergquist et al. (2013) / Al-Dulaimy, Alkhazraji, AlHadeethi and Sameer (2015) / Kakkad and Ahuja (2014) / Erande and Pimplikar (2016) / Iha and Iyer (2006) / Fuentes, Albacete-S and ens-Montes (2004) / Mehmood, Qadeer and Ahmad (2014) / Shinde and Pimplikar (2015) / Pankaj, Naman and Kunal (2013) / Chang (2009) / Cornelison (2013) / Mohideen and	18/25

		Vijayavel (2014) / Luburic (2013)	
3.	Training and Education	Metri (2005) / Gherbal et al. (2012) / Neyestani and Juanzon (2016) / Talib et al. (2010) / Erande and Pimplikar (2016) / Iha and Iyer (2006) / Pankaj, Naman and Kunal (2013) / Luburic (2013)	8/25
4.	Continuous Improvement and Innovation	Talib et al. (2010) / Yousif, Najm and Al-Ensour (2017) / Bergquist et al. (2013) / Al-Dulaimy, Alkhazraji, AlHadeethi and Sameer (2015) / Erande and Pimplikar (2016) / Iha and Iyer (2006) / Fuentes, Albacete-S and ens-Montes (2004) / Mehmood, Qadeer and Ahmad (2014) / Shinde and Pimplikar (2015) / Pankaj, Naman and Kunal (2013) / Chang (2009) / Cornelison (2013) / Mohideen and Vijayavel (2014) / Luburic (2013)	14/25
5.	Supplier Management	Metri (2005) / Gherbal et al. (2012) / Neyestani and Juanzon (2016) / Talib et al. (2010) / Yousif, Najm and Al-Ensour (2017) / Erande and Pimplikar (2016) / Iha and Iyer (2006) / Chang (2009)	8/25
6.	Employee Involvement	Metri (2005) / Gherbal et al. (2012) / Neyestani and Juanzon (2016) / Talib et al. (2010) / Yousif, Najm and Al-Ensour (2017) / Bergquist et al. (2013) / Kakkad and Ahuja (2014) / Erande and Pimplikar (2016) / Iha and Iyer (2006) / Mehmood, Qadeer and Ahmad (2014) / Shinde and Pimplikar (2015) / Pankaj, Naman and Kunal (2013) / Chang (2009) / Cornelison (2013) / Luburic (2013)	15/25
7.	Information and Analysis	Metri (2005) / Gherbal et al. (2012) / Neyestani and Juanzon (2016) / Talib et al. (2010) / Kakkad and Ahuja (2014) / Shinde and Pimplikar (2015) / Pankaj, Naman and Kunal (2013) / Chang (2009) / Luburic (2013)	9/25
8.	Process Management	Metri (2005) / Gherbal et al. (2012) / Neyestani and Juanzon (2016) / Talib et al. (2010) / Bergquist et al. (2013) / Kakkad and Ahuja (2014) / Erande and Pimplikar	10/25

		(2016) / Iha and Iyer (2006) / Shinde and Pimplikar (2015) / Chang (2009) / Luburic (2013)	
9.	Quality System	Metri (2005) / Chang (2009) / Luburic (2013)	3/25
10.	Strategic Quality Management	Metri (2005) / Yousif, Najm and Al-Ensour (2017)	2/25
11.	Design Quality Management	Metri (2005)	1/25
12.	Leadership	Gherbal et al. (2012) / Neyestani and Juanzon (2016) / Yousif, Najm and Al-Ensour (2017) / Bergquist et al. (2013) / Shinde and Pimplikar (2015) / Chang (2009) / Luburic (2013)	7/25
13.	Benchmarking,	Metri (2005) / Talib et al. (2010)	2/25
14.	Quality Culture	Metri (2005) / Talib et al. (2010) / Pankaj, Naman and Kunal (2013) / Luburic (2013)	4/25
15.	Human Resource Management	Talib et al. (2010)	1/25
16.	Strategic Planning	Talib et al. (2010) / Kakkad and Ahuja (2014)	2/25
17.	Employee Encouragement	Talib et al. (2010) / Mohideen and Vijayavel (2014)	2/25
18.	Teamwork	Talib et al. (2010) / Fuentes, Albacete-S and ens-Montes (2004)	2/25
19.	Communication	Talib et al. (2010) / Kakkad and Ahuja (2014)	2/25
20.	Product and Service Design	Talib et al. (2010)	1/25

Considering the above information in Table 2.5 related to the literature by different authors described their basic TQM principles differently nominate as “success factors, critical factors and important factors” under the same meaning of this sub chapter.

2.11 Total Quality Management to Enhance the Customer Satisfaction in Construction Industry

“The construction industry occupies a huge economic segment for any country and has a significant effect on the efficiency and development of other industries” (Al-Musleh, 2010, p.65). Along with that, OECD (2008) stated that the construction industry provides the buildings and infrastructure on which virtually every other industries depend. Foulkes and Ruddock (2013) argue that the construction industry plays an important role directly or indirectly within the economy.

According to the above statements by different authors, it is clearly demonstrated that the development of the construction industry is very important for any country as well as Sri Lanka. For that, customer satisfaction is very important and mainly affected as stated in the previous subchapters. Meantime while studying the previous sections of 2.11 and 2.10 has been identified that, TQM has a characteristic to enhance customer satisfaction in any industry. Therefore, the following sections present the relevant authors finding related to the TQM for enhancing customer satisfaction in the construction industry.

2.11.1 Main factors affecting to implementation of TQM in the construction Industry

Arditi and Gunaydin (1997) show that elements of TQM affect the quality of the process of building projects. Low and Peh (as cited in Pheng & Teo 2004) stated that some basic steps are essential to implementing TQM in construction projects. Similar to the above, Metri (2005) found that construction-related TQM framework on behalf of external and internal customer satisfaction.

H. Kuo and Lin Kuo (2010) found that TQM provides a quality-oriented organisational culture for Taiwan's construction industries. In the same way, Saeed and Hasan (2012) reviewed and examine a comprehensive literature review and contended 10 main success factors related to the construction industry.

Meantime because of TQM implementation in the USA, Dulaimy, Alkhazraji and Sameer (2015) reported that the TQM concept is modern for construction projects

and it is decided implemented in the construction industry purely based on the achievements of basic principles of customer satisfaction and continues improvement. Meantime Erande and Pimplikar (2016) found that the Indian construction industry achieved an increase in market share due to the implementation of some important TQM main factors. Based on the comprehensive analysis and examination of existing literature, Kakkad and Ahuja (2014) have also found the main success factor, which is dependent due to the successful implementation of TQM in the construction industry. Further Panuwatwanich and Nguyen (2017) mentioned that, when implementing the TQM in the Vietnamese construction industry, 10 main factors improved performance.

After the broad review of the aforementioned literature, Table 2.6 summarised and categorised the main factors of TQM expressed by the different authors who are concerned about the success of the construction industry.

Table 2.6: Main factors of Total Quality Management, which are affecting the construction industry

Item No.	Main Factors of TQM	Details of Authors	No's of Authors
1.	Develop a process approach toward TQM	Low and Peh (as cited in Pheng & Teo 2004) / Metri (2005) / Hasan (2012)	4/18
2.	Management commitment and leadership for TQM	Arditi and Gunaydin (1997) / Metri (2005) / Hsien Kuo and Lin Kuo (2010) / Hasan (2012) / Amaniampong, Salakpi and Bonye (2014) / Erande and Pimplikar (2016) / Erande and Pimplikar (2016) / Kakkad and Ahuja (2014) / Sherif (2010)	9/18
3.	Develop Education and Training	Arditi and Gunaydin (1997) / Metri (2005) / Hsien Kuo and Lin Kuo (2010) / Hasan (2012) / Erande and Pimplikar (2016) / Sherif (2010) / Burati et al. (1991) / Saeed and Hasan (2012) / Pheng and Teo (2004)	9/18
4.	Education to change the attitudes of staff	Low and Peh (as cited in Pheng & Teo 2004) / Hsien Kuo and Lin Kuo (2010) / Pheng and Teo (2004)	5/18

5.	Teamwork	Arditi and Gunaydin (1997) / Hsien Kuo and Lin Kuo (2010) / Saeed and Hasan (2012)	3/18
6.	Customer service	Arditi and Gunaydin (1997) / Metri (2005) / Hsien Kuo and Lin Kuo (2010) / Hasan (2012) / Amaniampong, Salakpi and Bonye (2014) / Dulaimy, Alkhazraji and Sameer (2015) / Erande and Pimplikar (2016) / Kakkad and Ahuja (2014) / Panuwatwanich and Nguyen (2017) / Mohammed (2016)	10/18
7.	Managers competency	Panuwatwanich and Nguyen (2017) / Pheng and Teo (2004)	2/18
8.	Development of Quality culture	Low and Peh (as cited in Pheng & Teo 2004) / Metri (2005) / Hsien Kuo and Lin Kuo (2010) / Hasan (2012) / Psomas (2016) / Panuwatwanich and Nguyen (2017) / Mohammed (2016) / Burati et al., (1991) / Saeed and Hasan (2012) / Pheng and Teo (2004)	11/18
9.	Prepare project quality plans for all levels of work	Low and Peh (as cited in Pheng & Teo 2004) / Metri (2005)	3/18
10.	Process management	Metri (2005) / Hsien Kuo and Lin Kuo (2010) / Hsien Kuo and Lin Kuo (2010) / Hasan (2012) / Erande and Pimplikar (2016) / Kakkad and Ahuja (2014)	6/18
11.	Labour efficiency	Panuwatwanich and Nguyen (2017)	1/18
12.	Rate of successful tenders or quality contractor selection	Panuwatwanich and Nguyen (2017)	1/18
13.	Supply chain management	Arditi and Gunaydin (1997) / Metri (2005) / Hsien Kuo and Lin Kuo (2010) / Hasan (2012) / Erande and Pimplikar (2016)	4/18
14.	Generate awareness	Low and Peh (as cited in Pheng & Teo 2004)	2/18
15.	Obtain the clients' commitment to quality	Low and Peh (as cited in Pheng & Teo 2004)	2/18

16.	Effectiveness of planning	Low and Peh (as cited in Pheng & Teo 2004) / Panuwatwanich and Nguyen (2017)	3/18
17.	Construction industry-specific factors	Arditi and Gunaydin (1997)	1/18
18.	Continuous improvement	Low and Peh (as cited in Pheng & Teo 2004) / Hsien Kuo and Lin Kuo (2010) / Psomas (2016) / Dulaimy, Alkhazraji and Sameer (2015) / Erande and Pimplikar (2016) / Meenakshi (2016)	7/18
19.	Partnering construction firms	Hsien Kuo and Lin Kuo (2010)	1/18
20.	Statistical methods for Information analysis	Arditi and Gunaydin (1997) / Metri (2005) / Hasan (2012) / Mohammed (2016)	4/18
21.	Employee empowerment and involvement	Low and Peh (as cited in Pheng & Teo 2004) / Metri (2005) / Hasan (2012) / Amaniampong, Salakpi and Bonye (2014) / Psomas (2016) / Kakkad and Ahuja (2014) / Mohammed (2016)	8/18
22.	Open communication	Hsien Kuo and Lin Kuo (2010) / Mohammed (2016)	2/18
23.	Human resources management	Hsien Kuo and Lin Kuo (2010) / Kakkad and Ahuja (2014) / Panuwatwanich and Nguyen (2017)	3/18
24.	Work safety	Panuwatwanich and Nguyen (2017)	1/18
25.	RISK Management	Hsien Kuo and Lin Kuo (2010) / Panuwatwanich and Nguyen (2017)	2/18

Erande and Pimplikar (2016) stated TQM has effectively contributed to winning considerable market share, increasing company reputation, and achieving and enhancing customer delight which is one step ahead of the customer satisfaction in construction and other industries.

2.11.2 Associate sub-factors of TQM for the construction Industry

During literature review, it was noticed that some sub-factors are related to the main factors mentioned in Table 2.7 presents these identified sub-factors from the review of the literature.

Table 2.7: Main factors and therein sub-factors of Total Quality Management, which are affecting the construction industry

Main Factor No.	Description of Main Factor	Sub Factor No.	Description of Sub Factor
1	Develop a process approach toward TQM	1.1	Conduct the TQM training and education for apartment construction employees.
		1.2	Invest the time and money for the above training and education programs.
2	Management commitment and leadership for TQM	2.1	Management commitment and leadership for implementation of TQM in apartment construction.
		2.2	Evaluate the benefits and advantages of TQM implementation in apartment building construction.
3	Develop Education and Training	3.1	Conducting technical and management training programs for apartment building construction employees.
4	Education to change the attitudes of staff	4.1	Conduct management training program
5	Develop Teamwork	5.1	Develop the inter-divisional positive relationship within the organization (Apartment building construction).
6	Customer Service	6.1	Priority to resolve matters related to the external customers, who are interested to buy apartments.
		6.2	Provide first time right solutions for matters related to the internal customers (employees) of the organization.
7	Develop Managers Competency	7.1	Implement the knowledge sharing system within the organisation.
8	Development of Quality culture within the organization of apartment building	8.1	Allocate money for quality in the annual budget of the organization of apartment building construction.
		8.2	Allow the sufficient time for quality

	construction	8.3	Implement the “5S ” concept within the organization of apartment building construction.
9	Prepare project quality plans for all levels of work	9.1	Prepare project quality plans for all levels of activities related to the apartment building construction work.
		9.2	Implement, practice, and follow the quality plan in apartment building construction.
		9.3	Review the feedback related to the quality plan of the above activities.
10	Development of process management	10.1	Every employee should aware of the organizational Vision and Mission of apartment building construction.
		10.2	Every employee should aware of the organizational Goals and Objectives of apartment building construction.
11	Develop Labour efficiency	11.1	Work under the timetable
12	Rate of successful tenders or quality contractor selection	12.1	Maintaining sub-contractors database in apartment building construction projects.
		12.2	Implement the sub-contractor evaluation and selection criteria for apartment building construction projects.
13	Development of Supply chain management	13.1	Maintaining material manufacturers and suppliers database for apartment building construction projects.
		13.2	Update the manufacturers' and suppliers' awareness about the material quality on the above projects.
		13.3	Monitoring of manufacturers and suppliers continues positive improvements for quality on the above projects.
		13.4	Improve the manufacturers' and suppliers' general practice about the work on time.
14	Development of Generate awareness	14.1	Implementation of PLAN, DO, CHECK, ACTION practice in apartment building construction projects.
15	Obtain the clients' commitment to quality	15.1	Obtain the client feedback on quality in apartment building construction.
16	Effectiveness of planning	16.1	Conduct progress review meetings.
17	Use the guidelines of construction industry-specific factors	17.1	Practice using quality codes, standards, drawings, conditions and specifications.

18	Encourage the continuous improvement of all work activities	18.1	Involvement to conduct research and development for work activities in apartment building construction.
		18.2	Evaluate and implementation of new ideas and innovations in apartment building construction.
19	Partnering construction firms	19.1	Study partnering methods
20	Developing of statistical methods for Information analysis	20.1	Maintaining of data record system for TIME, COST, and QUALITY construction activities in apartment buildings.
		20.2	Practising analysing the data and evaluating the result for the above work activities.
21	Employee empowerment and involvement in the final product	21.1	Everyone should responsible for the product of the apartment building as planned.
		21.2	Encourage the employees towards creating innovation and value engineering ideas for apartment building work.
22	Develop an open communication system within the organization	22.1	Develop the information transmission system from top to bottom & bottom to top within the organization.
23	Develop Human resources management	23.1	Encourage the employees to further higher education and carrier developments activities.
		23.2	Develop and execute an employee evaluation system for promotions and increments in the apartment building construction sector.
24	Develop Work safety	24.1	Study and prepare an appropriate SAFETY plan for Apartment building construction projects.
		24.2	Identify and nominate the emergency assembling locations in Apartment building projects.
		24.3	Allocating of sufficient budget for Work Safety in Apartment building construction projects.
		24.4	Encourage the employees to use Personal Protective Equipment in Apartment building construction projects.
		24.5	Maintaining accident report register in Apartment building construction projects.
25	Develop RISK Management	25.1	Encourage employees to maintain RISK register related to the apartment building construction.

		25.2	Develop the appropriate RISK measuring system related to the apartment building construction.
		25.3	Study and select suitable RISK evaluation for the above.
		25.4	The study investigates and identifies the suitable system for responding to RISK.

The following paragraphs are elaborately discussing relevant literature for a better understanding of the main factors and the adoption of TQM in the construction industry.

Sherif (2010) recommended that TQM training must be on all the levels of a construction company, including top management, middle management, first-line managers, and employees. In addition to the above Saeed (2012) noticed in his case study, establishing a team from inside or outside the company for training and education program for construction company top management and employees, regarding the TQM concept. Further, above, Saeed (2012) recommended that, allocating a percentage of company profit for purpose of TQM education and training programs. According to Pheng and Teo (2004), an understanding of TQM requirements is a strategic review of education and implementation plans, provision of ample budget and resources, teamwork, training and timely feedback.

Mustafa and Bon (2012) noted that the role of top management leadership and commitment is very important within the Malaysian service sector organizations when it comes to TQM implementation. Metri (2005) stated that many times TQM initiatives have failed, due to the lack of senior management commitment, therefor management commitment is essential. On the other hand, Waleed (2012) stated that, for the implementation of TQM, the environment is positive but first awareness of TQM and its benefits had to be created. Similar to the above, Polat, Damci and Tatar (2011) discussed their survey and reveals that contractors are aware of the benefits of TQM implementation in the construction industry.

According to H. Hailu, Mengstu and Hailu (2018), Construction organization employees must educate on the needs of TQM so that it will help to reduce the

number of customer complaints due to construction defects. Additionally, Arditi and Gunaydin (1997) stated that under the TQM quality becomes everyone's responsibility and training must be targeted for every level of employees of the company.

Lepkova et al., (2016) stated, that construction companies use TQM, but they struggle with implementation, because of failure to fulfil the customers' needs properly. Similar to the above, Metri (2005) contended that construction organisations may outperform the competition by being able to anticipate and quick response to customers' requirements with new ideas and technologies and to produce constructed facilities that satisfy or delight customers' expectations. In addition to the above Sherif (2010), the research found that top management of construction companies should communicate with the employees.

Arditi and Gunaydin (1997) stated that the ultimate goal is to get all construction project stakeholders involved with the TQM process. Arditi and Gunaydin (1997) further stated that, at the construction company level, teams composed of department representatives are necessary to implement TQM throughout that organization. As a result, the same authors concluded that teamwork among the parties such as structural, electrical, environmental, civil engineers, architects and others is strong shows that, the quality goal of the construction. Similarly, Femi (2015) stated, that Plan-Do-Check-Action is an important way by which industry can improve through TQM. According to Dulaimy, Alkhazraji, ALHadeethi and Sameer (2015) it can be used to reduce the gap between the "customer requirements and current status".

Rafaai and Aziz (2018) further contended that "customer feedback empowers construction companies to separate themselves from their rivals and gain sustainable advantages". Rajiv and Harinath (2018) found that effective implementation of elements of TQM will lead to the success of construction industries. In addition to the above Rajiv and Harinath (2018) express, that those factors are continuous improvement, teamwork, effective use of statistical methods and importantly drawings and specifications prepared concerning the quality standards.

Meantime, Arditi and Gunaydin (1997) categorised and expressed that, construction

industry-specific factors of codes, standards, drawings, specifications and constructability analysis are elements of the TQM in the construction process towards customer satisfaction.

Sherif (2010) research recommended that, as far as participation and communications are concerned, construction organizations should effectively communicate information to employees. Deming (as cited in Sherif, 2010) strongly stated the importance of education and training for continual updating and improvements, identifying one source of human motivation at work as intrinsic motivation more generally grooving learning and developing one's self. Further to the above David and Murat (as cited in Sherif, 2010) noticed that construction industry professionals are aware of the importance of quality training and education. In addition to the above, Waleed (2012) stated, that training and education are important parts of any construction organization that can result in increased performance efficiency.

Meantime, Salem, Solomon, Genaidy and Luegring (2005) noticed that, when the 5S system implementation in the construction industry, it can obtain the benefits of safety improvement, productivity, quality and set up time improvements, creation of space, reduce lead times, cycle times, increase machine uptime, improve morale, teamwork and continues improvement.

Husin, Adnan and Jusoff (2008) stated that construction safety management and quality management show that similar approach concept. Husin et al., (2008) further contended that safety management has included five key areas of safety policy, organising, planning /implementation, safety measures and safety revival. Similar to the above, Tamimi, Ansari, Kashwani and Sajwani (2017) contended that total safety management (TSM) and TQM are very similar concepts. Tamimi et al., (2017) evident that, TSM aim to prevent accident or near-miss in construction projects by planning for safety, providing clear lines for responsibilities, communicating and ensuring that hazards and risk identification in construction sites for the entire safety of workers, labours and staff. Tamimi et al., (2017) further pointed out that, Peterson's theory on TSM has insisted to provided and using personal protective equipment (PPE).

According to the above literature, those associated sub-factors are directly and indirectly supported to realise and understand the main factors, which are impacted to be implemented in the construction industry.

2.11.3 Barriers to implementation of TQM in the construction industry

In accordance with the above two sub sections expressed, TQM is a very important concept for the construction industry. However, it is still new for the construction many countries have been reluctant to accept this new concept the first time of implementation. As defined by the many authors, TQM is a long-term resultant philosophy. Therefore, it is very important to research and identify that, barriers related to the implementation of TQM in the construction industry. For that, this sub section of the literature review goes through the different authors' findings related to the barriers.

Mohammed's (2016) research found that the barriers to the implementation of TQM in the construction organizations include criticisms of TQM by members of the organization, organizational cultural barriers, lack of information and communication, lack of customer satisfaction, organizational culture, and its change, and lack of motivation system and rewards. Burati et al. (1991) contended that there are three main barriers to the implementation of TQM:

1. Lack of understanding of both TQM and QA/QC
2. Poor management and workmanship in the vendors and sub-contractors companies
3. TQM program should not simply be adopted from a consultant and deployed

Saeed and Hasan (2012) argue that there are several reasons ahead as barriers to the execution of TQM in the construction industry. According to the same authors, those reasons are the fragmented nature of the construction industry, lack of education about TQM, corruption, negligence, irresponsibility behaviour in the construction industry, long-term process to obtain benefits and Changing organizational culture.

Connecting to the above, some authors find the biggest hurdles for construction firms may face during the implementation phase of TQM as follows.

1. Poor understanding of TQM concept by managers.
2. Lack of drive from government authorities.
3. Construction companies awaiting post-implementation results of TQM.
4. Problem with the cost of TQM
5. Lack of feasibility for small firms.
6. Resistance from employees to change their existing culture.
7. Resistance to learning about the TQM.

Therefore, to overcome those previously mentioned barriers it is required to follow the main factors and their therein-associated sub factors under the sub sections 2.11.1 and 2.11.2 of this chapter.

2.12 Summary

As a summary of this literature review, understand and discover that housing is one of the basic needs of people. Types of apartments available in Sri Lanka are mainly categorised as a super luxury, luxury, and semi-luxury depending on facilities. Maximum demand for apartment buildings was recorded during the period from 2007 to 2017 in Sri Lanka. Customer satisfaction is crucial in any business sector and it is important to grow profit margin by increasing the market share.

TQM is the integration of all functions and processes within the organisation to achieve continuous improvement of the quality of goods and services. Its aim is to enhance the customer satisfaction in any industry including construction. It reviewed and studies the 20 main factors and therein sub-factors that are related to the implementation of TQM in the construction industry. According to that, it was successfully achieved the first and second research objectives as mentioned in the subchapter 1.4.

CHAPTER 3

3.0 RESEARCH METHODOLOGY

3.1 Introduction

In the previous chapter of this research, the literature review refers to the documentary statements and other researches findings related to the research aim and objectives. Apart from the above, the purpose of this chapter is to identify, understand, and clarify the methodological framework to conduct this research. Under chapter 3, it was concerned with the logical and suitable method to design the research, research fieldwork, identification of sample population, participation, selection and design of the research instruments, data collecting system and data analysing method subjected to the given scope and limitation under the first chapter of this research.

3.2 Research Design

According to Akhtar (2016) that, “research design can be considered as the structure of research, it is the Glue that holds all of the elements in a research project together, in short, it is a plan of the proposed research work”. It provides the total programme to achieve within the given period and given budget and work plan.

3.3 Research Process

“It is essential to know about a brief overview of the research process before the details of research methodology” (Bist, 2014). The following the research process flowchart, which is under the Figure 3.1 forwarded for reference.

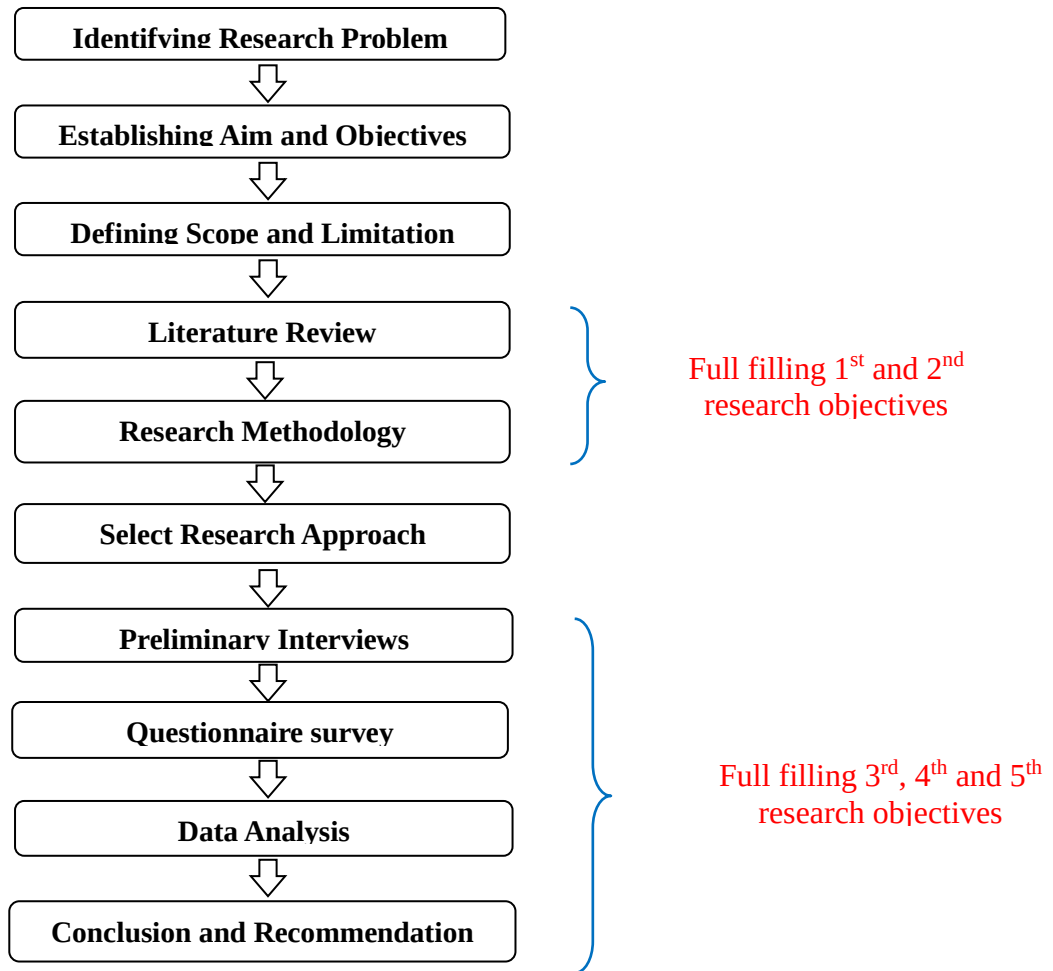


Figure 3.1: Research process for study

3.4 Research Approach

“Research approaches are plans and procedures for research that span the steps from broad assumptions to detail method of data collection, analysis, and interpretation” (Creswell, 2014). Creswell (2014) and William (2007) stated that there are three research approaches as qualitative, quantitative, and mixed-method.

This research appeared that both characteristics of qualitative and quantitative approaches are as follows.

- Survey and interview questions are related to the open and close-ended questions
- Data collection depends on numerical data, other authors’ findings, and interviewees’ ideas.

- Data analysis follows the content analysis and RII of the standard theoretical method.

Considering the above, mixed-method is the suitable approach to conduct this research towards to success of the research aim, by achieving of given research objectives under chapter one.

3.5 Research Strategy

Sahay (2016) found and stated that researchers used one or more research strategies to conduct their research design, which is nothing but an overall structure of the particular research giving details for various elements of design. “A survey design provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population” (Creswell, 2014). According to Mathers, Fox and Hunn (2009) surveys have several advantages including internal and external validity, efficiency, coverage, ethical advantages and flexibility.

Based on the above reasons stated by the authors and compared to this research, the survey is a more suitable strategy to conduct this research out of other strategies towards to successes of the research aim.

3.6 Data Collection Techniques

In connection with section 3.5, it was declared that the mixed method is the selected approach to conduct this research. Even more under sub section 3.6 research strategy that survey is the selected strategy to conduct this research. Next, those appropriate data collection methods need to be selected.

Taking into consideration and studying the current behaviour of this research need to select both semi-structured interviews (i.e. preliminary interviews) and questionnaire surveys as data collection techniques here because of the mixed methods approach.

3.6.1 Preliminary interviews

There are 25 numbers of factors identified through the literature review, which are affecting for implementation of TQM in the construction industry to enhance customer satisfaction. However, in order to verify and confirm the validity and

adaptability of those factors for the Sri Lankan semi-luxury apartments, it is required to conduct a preliminary interview under the selected sample population. Because it is very important to acknowledge that before including these factors in the questionnaire survey paper. Therefore, this subchapter will study and research the definitions characteristics and classification of an interview.

“Interviews are used in qualitative research as the main tool to collect data” (Govender, 2012, p.24). The purpose is to provide a description of participants' views to enable the researcher to gain an understanding of the participants' experiences (Govender, 2012). According to Kumar (2011), interviewing is a commonly used method of collecting data from the community. Burns (as cited in Kumar, 2011) stated that an interview is a verbal interchange, often face to face and sometimes it can do it through the telephone. Finally, Govender (2012), Creswell (2014), and Kumar (2011) express the classification of interview types as Structured, Unstructured, and Semi-structured.

According to the above findings, it was decided that, follow the semi-structured type interviews under the face to face dialogues and telephone conversations for executing this research subjected to the selected sample method.

According to the above requirement that it is essential to have a suitable guideline and interview form with relevant questions to obtain independent comments and responses from particular interviewees. As a result of that, it is included two questions one is directed to the verification of 25 no's of main factors which are found through literature review and the second question raised to obtain sub-factors that are closely related to the main factors in order to further understanding of main factors.

3.6.2 General information of interviewees

According to the above, three structured interviews were carried out with industry professionals out of five proposed, who interfered with external and internal customers under the constriction of semi-luxury apartment buildings in Sri Lanka. An ephemeral description of those interviewees is described in Table 3.1.

Table 3.1: Details of sample selection for the preliminary interview

Information Category	Interviewee X	Interviewee Y	Interviewee Z
Type of Organisation	Construction Organisation	Consultant Organisation	Construction Organisation
Designation	Project Manager	Resident Engineer	Contract Manager
Professional Category	Engineer	Chartered Engineer	Chartered QS
Work Experience	19 Years	15 Years	11 Years

Interview results with response answers will be discussed in chapter 4 and sample interview forms will be displayed under the annexure category in the latter part of this research content.

3.6.3 Questionnaires survey

As a final elected method of data collection techniques section 3.6 that, the questionnaires survey method has been selected, out of other methods to conduct this research. Fanning (2005) defined that, a questionnaire survey provides respondents to voice their concerns and incept change or this survey is meaning of validating their participation or association with a group or endeavour. Mathers et al. (2009) further stated that it can be cheaper and more convenient than personal interviewing and quicker if the sample is larger and widely dispersed. According to the above general information of questionnaires survey the sample questionnaires survey format is attached as annexure B.

3.6.4 Sample selection

The selection of an appropriate sampling technique is very important in this research. Therefore, in order to understand and study the sampling and selection of suitable sample techniques, the findings of the following literature might be guided towards successful selection.

According to RSA (2015), sampling is a process of selecting participants from a

population and participants in research should be as representative as possible of the target population. NOA (1992) categorized and stated that samples can be selected in nine ways. According to the above classification of the sampling techniques, it is technically evaluated and decided to follow the convenience sampling method to collect the data from the total population of contractors and consultants who are attached to the semi-luxury apartment buildings construction industry. According to the characteristics of those selected sample population are readily available in the building construction industry but they are very busy professionals. However, those, above selected samples are representing the whole building construction scope of work including apartment buildings construction. Therefore, that chosen sampling technique of convenience sampling method is more suitable and fit for fulfilling the intention of the research methodology.

3.6.5 General information of questionnaires survey

Following the sample selection criteria were described under the above sub section 3.6.3 relevant major sample extraction out of the total population has been categorised as given below under Table 3.2.

Table 3.2: Classification of major sample selection

No.	Sample Classification	Sample Weight
1	Apartment building contractors	20
2	Consultants who are attached to the apartment building construction	20
TOTAL		40

Above Table 3.2, briefing and segmenting the major category of sample selection that further details described under Table 3.3.

Table 3.3:Details of sample selection for questionnaire survey

No.	Classification of Questionnaires Distribution	Qualification	Age Range	Work Experience
Under Contractor Organisation				
1	Director – 1	Ch. Eng.	$Y \geq 65$	25-30 Years
2	Director – 2	Dip. Holder	$60 \leq Y < 65$	30-35 Years
3	General Manager - 1	Ch. Eng.	$55 \leq Y < 60$	25-30 Years
4	General Manager - 2	B.Sc. Eng.	$55 \leq Y < 60$	20-25 Years
5	General Manager - 3	Dip. Holder	$60 \leq Y < 65$	20-25 Years
6	Deputy General Manager	B.Sc. Eng.	$45 \leq Y < 50$	15-20 Years
7	Contract Managers - 1	Ch. QS	$40 \leq Y < 45$	10-15 Years
8	Contract Managers - 2	Ch. QS	$40 \leq Y < 45$	15-20 Years
9	Design Manager	Ch. Archi.	$45 \leq Y < 50$	15-20 Years
10	Procurement Manager - 1	B.Sc. Mgt.	$35 \leq Y < 40$	10-15 Years
11	Procurement Manager - 2	Dip. Holder	$40 \leq Y < 45$	10-15 Years
12	Compliance Manager	B.Sc. Eng.	$45 \leq Y < 50$	15-20 Years
13	Safety Manager - 1	Dip. Holder	$40 \leq Y < 45$	10-15 Years
14	Safety Manager - 2	Certificate Holder	$50 \leq Y < 55$	15-20 Years
15	Project Manager - 1	B.Sc. Eng.	$35 \leq Y < 40$	10-15 Years
16	Project Manager - 2	B.Sc. Eng.	$50 \leq Y < 55$	20-25 Years
17	Project Manager - 3	B.Sc. Eng.	$45 \leq Y < 50$	20-25 Years
18	Project Manager - 4	B.Sc. Eng.	$35 \leq Y < 40$	10-15 Years
19	Project Manager - 5	B.Sc. Eng.	$45 \leq Y < 50$	20-25 Years
20	Construction Manager	Diploma Holder	$55 \leq Y < 60$	25-30 Years
Under Consultant Organisation				
21	Lead Consultant	Ch. Archi.	$60 \leq Y < 65$	20-25 Years

22	Lead Architect	Ch. Archi.	$60 \leq Y < 65$	20-25 Years
23	Project Architect - 1	Ch. Archi.	$40 \leq Y < 45$	20-25 Years
24	Project Architect - 2	Ch. Archi.	$35 \leq Y < 40$	10-15 Years
25	Project Architect - 3	Ch. Archi.	$35 \leq Y < 40$	10-15 Years
26	Cost Consultant - 1	Ch. QS	$50 \leq Y < 55$	25-30 Years
27	Cost Consultant - 2	Ch. QS	$45 \leq Y < 50$	20-25 Years
28	Cost Consultant - 3	B.Sc. QS	$40 \leq Y < 45$	15-20 Years
29	Cost Manager - 1	B.Sc. QS	$35 \leq Y < 40$	10-15 Years
30	Cost Engineer - 1	Dip. Holder	$45 \leq Y < 50$	15-20 Years
31	Project QS - 1	B.Sc. QS	$30 \leq Y < 35$	5-10 Years
32	Project QS - 2	B.Sc. QS	$25 \leq Y < 30$	5-10 Years
33	Structural Engineer - 1	Ch. Eng.	$50 \leq Y < 55$	20-25 Years
34	Structural Engineer - 2	Ch. Eng.	$40 \leq Y < 45$	15-20 Years
35	Structural Engineer - 3	Ch. Eng.	$30 \leq Y < 35$	10-15 Years
36	MEP Manager – 1	Ch. Eng.	$50 \leq Y < 55$	20-25 Years
37	MEP Engineer – 1	B.Sc. Eng.	$55 \leq Y < 60$	20-25 Years
38	MEP Engineer – 2	B.Sc. Eng.	$40 \leq Y < 45$	10-15 Years
39	Resident Engineer - 1	B.Sc. Eng.	$45 \leq Y < 50$	15-20 Years
40	Resident Engineer - 2	B.Sc. Eng.	$50 \leq Y < 55$	20-25 Years

According to the scope and limitations under chapter 01, the above sample selection has to be limited to the geographical area of Malabe and Galle to collect the research data. But with reference to the Table 3.2 and Table 3.3, those selected sample populations of semi-luxury apartments contractors and respective consultant's operations are not limited to the area where mentioned in the scope and limitation and herewith considering only their particular service contribution for building up apartment buildings in the geographical area where noted in the scope and limitation.

Questionnaire survey results with multiple responses will be discussed in chapter 4 and the sample questionnaire survey form will be displayed under the annexure category in the latter part of this research content.

3.7 Data Analysis Techniques

According to Kawulich (2015) and LeCompte and Schensul (as cited in Kawulich, 2015) data analysis helps to reduce collected data and make sense of them into a one-story to understand.

Manual content analysis was used in this research in order to systematically sort and summarize the collected data through preliminary interviews. The literature stated that “Content analysis is an approach to quantify qualitative information by systematically sorting and comparing items of information in order to summarize them” (GAO, 2013). The relative importance index technique used for this research to analyse the data, which was collected through a questionnaire survey and can describe as follows.

Raigo et al. (2016) stated that the relative importance index technique is used to determine the relative importance of the various causes. Similar to the above author Rooshdi et al. (2018) contended that relative importance index analysis is used to rank the criteria according to their relative importance. In addition to the above, Raigo et al. (2016) further included that, if the relative importance index is (**RII**),

$$\mathbf{RII} = \sum \mathbf{W} / (\mathbf{A} * \mathbf{N})$$

Where **W** is the weighting given to each factor by the respondents. The same author further explained that **A** is the highest weight and **N** is the total number of respondents by sample population. Finally, they concluded and stated that a higher value of RII is a more important cause in the respective scenario.

According to the above formula of data analysis technique and content of the data collection technique of this research, the model calculation can demonstrate and can describe as follows.

Questionnaire survey ranking weight rang and ranking weight: -

Rating scale A - Level of Importance for your organization

Not Important	Little Important	Average Important	Important	Very Important
1	2	3	4	5

Ranking weight range

Ranking Weight

Rating scale B - Level of presently practising performance in your organization

Not Practicing	Aware Only	Slightly Practicing	Practising	Strongly Practicing
1	2	3	4	5

Ranking weight range

Ranking Weight

Demonstration of main factor and sub-factors: -

Main Factor

10 Development of Supply chain management

A B

10.1 Maintaining material manufacturers and supplier's databases for apartment building construction projects

☐ ☐

10.2 Update the manufacturers' and supplier's awareness about the material quality of the above projects

☐ ☐

10.3 Monitoring of manufacturers and suppliers continues positive improvements for quality on the above projects

☐ ☐

10.4 Improve the manufacturers' and suppliers' general practice about the work on time.

☐ ☐

Sub Factors

Calculation demonstration: -

$$\begin{aligned}\sum W &= 5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1 \\ &= (5 \times 1) + (4 \times 1) + (3 \times 1) + (2 \times 1) + (1 \times 1) \\ &= 15\end{aligned}$$

A (highest weight of ranking range) = 5

N (numbers of respondents) = 5

$$RII = \sum W / (A * N)$$

$$RII = 15 / (5 \times 5)$$

$$RII = 0.6$$

Mean RII Value of main factor No.10 = RII 10

$$RII\ 10 = \frac{RII\ 10.1 + RII\ 10.2 + RII\ 10.3 + RII\ 10.4}{\text{Number of Sub Factors}}$$

Data evaluation and decision making: -

Questionnaire survey result evaluation and decision-making are very important to verify the impotency and present practising situation of selected main factors, which are identified through chapter 2 of the literature survey. For that, this sub chapter of the data analysis technique selected that, RII as the main evaluation criteria in this research. In the next chapter, four of the research findings and analysis will discuss the RII results based on the following key phrases.

- Calculate the all RII values for sub factors related to the main factors
- Calculate the RII values for main factors under the impotency and practice basis of sub factors.
- Tabulate the questionnaire survey results under the main and sub-factors in descending order subjected to the categories of contractors and consultant's organisation.

- Ranking the main factors including sub factors under the priority basis of impotency and practising frequency
- Identify and decide the most essential and effective factors which are affecting to research aim.

3.7.1 Sample calculation

According to the above data analysis technique, the sample demonstration herewith is forward for further explaining of RII formula calculation based on the data received from the questionnaire survey paper. A sample calculation is considered under the sixth main factor as a question raised to the sample population with three sub-factors. Following Figure 3.2 expresses that arrangement of the main factor No. 06 and Table 3.4 elaborately expresses the calculation demonstration of data relevant to the main and sub factor of No.06.

Main Factor - 06						
Development of Quality culture within the organization of apartment building construction						
Rating Scale A - Level of Importance for your organization						
Not important	Little important	Somewhat important	Important	Very important		
1	2	3	4	5		
Rating Scale B - Level of presently practicing performance in your organization						
Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing		
1	2	3	4	5		
Rating Factor			A	B		
6.1	Allocate money for quality in annual budget of organization of apartment building construction					
6.2	Allow the sufficient time for quality					
6.3	Implement the " 5S " concept within the organization of apartment building construction					

Figure 3.2: Questionnaire survey format arrangement of Main Six Factors

Table 3.4: RII values calculation for Main Six Factor

Sub Factor - 6.01										
	Rating Scale - A					Rating Scale - B				
Ranking Weight	1	2	3	4	5	1	2	3	4	5
32 Respondents Frequency	0	0	5	18	9	1	8	9	10	4
RII = ΣW /(A * N)	0	0	15	72	45	1	16	27	40	20
	132					104				
RII Value	0.825					0.650				
Sub Factor - 6.02										
	Rating Scale - A					Rating Scale - B				
Ranking Weight	1	2	3	4	5	1	2	3	4	5
32 Respondents Frequency	0	1	2	13	16	0	0	11	14	7
RII = ΣW /(A * N)	0	2	6	52	80	0	0	33	56	35
	140					124				
RII Value	0.875					0.775				
Sub Factor - 6.03										
	Rating Scale - A					Rating Scale - B				
Ranking Weight	1	2	3	4	5	1	2	3	4	5
32 Respondents Frequency	0	1	4	13	14	0	1	8	13	10
RII = ΣW /(A * N)	0	2	12	52	70	0	2	24	52	50
	136					128				
RII Value	0.850					0.800				

RII Value for Main Factor 06

$$\text{Mean RII value for rating scale A} = \frac{0.825 + 0.875 + 0.850}{3} = 0.850$$

$$\text{Mean RII value for rating scale B} = \frac{0.650 + 0.775 + 0.800}{3} = 0.742$$

3.8 Summary

Introducing of research methodology including sub-chapters of research design, research process, research approach, research strategy, data collection techniques, sample selection and data analysis. Even more, this chapter has discussed the research strategy to select the suitable data collection method and sample selection with considering the total population under the given scope and limitation. As a result of that, it is identified that a questionnaire survey is the most convenient and appropriate method of data collection for this research. Then after, it is introduced that, the data analysis system by way of using the RII technique which is most frequently used by other researchers as well.

Finally, the latter part of this chapter gradually demonstrated and illustrated the data analysis and calculations methods with simple examples and briefly explain the decision making criteria for this research to achieve the research aim as described in chapter one.

CHAPTER 4

4.0 DATA ANALYSIS AND RESEARCH FINDINGS

4.1 Introduction

Chapter 3 described, illustrated, and discussed the research methodology, which has been adopted to execute this research study. Chapter 4 expresses that scientifically analysing data delivered from selected samples and obtaining the results as research findings. Similarly, chapter 4, follow the analysing and calculation method where describe in the previous chapter and compare and contrast the results of analysing outcome within the criteria which are subjected to the scope of the research strategy towards achieving the research aim as given in chapter one.

4.2 Analysis of TQM's Main Factors that Enhance the Quality of the Semi-Luxury Apartment Construction Process to Ensure Customer Satisfaction

Corresponding to Table 2.6, in the sub section of 2.11.1 that, there were 25 no's of main factors have been identified by means of literature review which are affecting to ensure the customer satisfaction in the semi-luxury apartment construction process by TQM main factors. In connection to the sub section 3.6.2, the following preliminary interview results obtain to verify the adaptability of those 25 main factors related to the above-captioned topic under question no.1 of the preliminary interview. Same as above, question no.2 contains sub-factors that are directly affecting to main factors, understand, and realise the above-mentioned same factors.

4.2.1 Response to preliminary interviews

Following the independent response, results were received from three no's of interviewees out of five, with reference to questions one and two as given below.

Question 01 :-

Are you agreed with following factors that would be affected to enhance the internal and external customer satisfaction in Sri Lankan semi luxury apartment buildings by using TQM concept?

Table 4.1: Interview results of main factors

Main Factor No.	Description of Main Factor	Responds of Interviewees		
		X	Y	Z
1	Develop a process approach toward TQM	Yes	Yes	Yes
2	Management commitment and leadership for TQM	Yes	Yes	Yes
3	Develop Education and Training	Yes	Yes	Yes
4	Education to change the attitudes of staff	No	No	No
5	Develop Teamwork	Yes	Yes	Yes
6	Customer Service	Yes	Yes	Yes
7	Develop Managers Competency	No	No	No
8	Development of Quality culture within the organization of apartment building construction	Yes	Yes	Yes
9	Prepare project quality plans for all levels of work	Yes	Yes	Yes
10	Development of process management	Yes	Yes	Yes
11	Develop Labour efficiency	No	No	No
12	Rate of successful tenders or quality contractor selection	Yes	Yes	Yes
13	Development of Supply chain management	Yes	Yes	Yes
14	Generate awareness	Yes	Yes	Yes
15	Obtain the clients' commitment to quality	Yes	Yes	Yes
16	Effectiveness of planning	No	No	No
17	Use the guidelines of construction industry-specific factors	Yes	Yes	Yes
18	Encourage the continuous improvement of all work activities	Yes	Yes	Yes

19	Partnering construction firms	No	No	No
20	Developing of statistical methods for Information analysis	Yes	Yes	Yes
21	Employee empowerment and involvement in the final product	Yes	Yes	Yes
22	Develop an open communication system within the organization	Yes	Yes	Yes
23	Develop Human resources management	Yes	Yes	Yes
24	Develop Work safety	Yes	Yes	Yes
25	Develop RISK Management	Yes	Yes	Yes

According to Table 4.1, there are 5 main factors out of 25 that resulted in a negative response by all 3 interviewees by stating “No” due to the different reasons as follows.

Table 4.2: Reasons for negative response to the main factor

No.	Reasons of Negative Respond for Main Factor	Main Factor - 04	Main Factor - 07	Main Factor - 11	Main Factor - 16	Main Factor - 19
1	This purpose will be covered by other main factors	×		×	×	
2	It is not practical	×	×	×	×	
3	No any reliable/standard guideline	×				
4	The manager should incur these types of characters as knowledge		×			
5	Less impact purpose		×			
6	Very hard to achieve, due to the current culture of the construction industry			×		

7	Hard to achieve, due to no proper mechanism to measure				×	
8	No, the suitable built environment in Sri Lanka					×
9	It is not practical, because of no, early experience in Sri Lanka					×
10	No, such requirement for the Sri Lankan construction industry					×

Based on Table 4.2 the reasons for negative responses for the main factor reason, it was decided not to include those 5 main factors in the questionnaire survey format for the purpose of data collection via the questionnaire survey as described under the sub section of 3.6.3.

Question 02 :-

What are the most suitable sub factors that affected for further understanding of above main factors where mentioned under the question 01 as given bellow?

According to the above question no. 02, following sub factors, proposed and discussed by interviewees concerning the main factors. Correspondingly, as per the sub section 2.11.2 under the literature review, some of the authors are directly discussed, pointed out and critically evaluated those sub-factors in their literature.

Table 4.3: Interview results and authors' reference of sub factors

No.	Description of Sub Factor	Responds of Interviewees			Sub-section 2.11.2 / Authors Who are Talk about the Sub Factors
		X	Y	Z	
1.1	Conduct the TQM training and education for apartment construction employees.	Yes	Yes	Yes	Sherif (2010) / Saeed (2012)
1.2	Invest the time and money for the above training and education	Yes	Yes	Yes	Saeed (2012) / Pheng and Teo

	programmes.				(2004)
2.1	Management commitment and leadership for implementation of TQM in apartment construction.	Yes	Yes	Yes	Mustafa and Bon (2012) / Metri (2005)
2.2	Evaluate the benefits and advantages of TQM implementation in apartment building construction.	Yes	Yes	Yes	Polat, Damci and Tatar (2011) / Waleed (2012)
3.1	Conducting technical and management training programs for apartment building construction employees.	Yes	Yes	Yes	H. Hailu, Mengstu and Hailu (2018) / Arditi and Gunaydin (1997)
4.1	Develop the inter-divisional positive relationship within the organization (Apartment building construction).	Yes	Yes	Yes	Arditi and Gunaydin (1997) / Mohammed (2016)
5.1	Priority to resolve matters related to the external customers, who are interested to buy apartments.	Yes	Yes	Yes	Lepkova et al., (2016) / Metri (2005)
5.2	Provide first time right solutions for matters related to the internal customers (employees) of the organization.	Yes	Yes	Yes	Sherif (2010)
6.1	Allocate money for quality in the annual budget of the organization of apartment building construction.	Yes	Yes	Yes	Waleed (2012)
6.2	Allow the sufficient time for quality	Yes	Yes	Yes	Waleed (2012)
6.3	Implement the "5S " concept within the organization of apartment building construction.	Yes	Yes	Yes	Salem et al., (2005)
7.1	Prepare project quality plans for all levels of activities related to the apartment building construction work.	Yes	Yes	Yes	-
7.2	Implement, practice, and follow the quality plan in apartment building	Yes	Yes	Yes	-

	construction.				
7.3	Review the feedback related to the quality plan of the above activities.	Yes	Yes	Yes	-
8.1	Every employee should aware of the organizational Vision and Mission of apartment building construction.	Yes	Yes	Yes	-
8.2	Every employee should aware of the organizational Goals and Objectives of apartment building construction.	Yes	Yes	Yes	-
9.1	Maintaining sub-contractors database in apartment building construction projects.	Yes	Yes	Yes	-
9.2	Implement the sub-contractor evaluation and selection criteria for apartment building construction projects.	Yes	Yes	Yes	-
10.1	Maintaining material manufacturers and suppliers database for apartment building construction projects.	Yes	Yes	Yes	-
10.2	Update the manufacturer and suppliers' awareness about the material quality on the above projects.	Yes	Yes	Yes	-
10.3	Monitoring of manufacturers and suppliers continues positive improvements for quality on the above projects.	Yes	Yes	Yes	-
10.4	Improve the manufacturers' and suppliers' general practice about the work on time.	Yes	Yes	Yes	-
11.1	Implementation of PLAN, DO, CHECK, ACTION practice in apartment building construction projects.	Yes	Yes	Yes	H. Hailu, Mengstu and Hailu (2018) / Dulaimy et al., (2015)

12.1	Obtain the client feedback on quality in apartment building construction.	Yes	Yes	Yes	Rafaai and Aziz (2018)
13.1	Practice using quality codes, standards, drawings, conditions and specifications.	Yes	Yes	Yes	Arditi and Gunaydin (1997) / Rajiv and Harinath (2018)
14.1	Involvement to conduct research and development for work activities in apartment building construction.	Yes	Yes	Yes	-
14.2	Evaluate and implementation of new ideas and innovations in apartment building construction.	Yes	Yes	Yes	Panuwatwanich and Nguyen (2017)
15.1	Maintaining of data record system for TIME, COST, and QUALITY construction activities in apartment buildings.	Yes	Yes	Yes	-
15.2	Practising analysing the data and evaluating the result for the above work activities.	Yes	Yes	Yes	-
16.1	Everyone should responsible for the product of the apartment building as planned.	Yes	Yes	Yes	Arditi and Gunaydin (1997)
16.2	Encourage the employees towards creating innovation and value engineering ideas for apartment building work.	Yes	Yes	Yes	-
17.1	Develop the information transmission system from top to bottom & bottom to top within the organization.	Yes	Yes	Yes	Sherif (2010) / Waleed (2012)
18.1	Encourage the employees to further higher education and carrier developments activities.	Yes	Yes	Yes	Sherif (2010) / Waleed (2012)
18.2	Develop and execute an employee evaluation system for promotions and increments in the apartment	Yes	Yes	Yes	-

	building construction sector.				
19.1	Study and prepare an appropriate SAFETY plan for Apartment building construction projects.	Yes	Yes	Yes	Husin et al., (2008) / Tamimi et al., (2017)
19.2	Identify and nominate the emergency assembling locations in Apartment building projects.	Yes	Yes	Yes	-
19.3	Allocating of sufficient budget for Work Safety in Apartment building construction projects.	Yes	Yes	Yes	-
19.4	Encourage the employees to use Personal Protective Equipment in Apartment building construction projects.	Yes	Yes	Yes	Tamimi et al., (2017)
19.5	Maintaining accident report register in Apartment building construction projects.	Yes	Yes	Yes	Husin et al., (2008) / Tamimi et al., (2017)
20.1	Encourage employees to maintain RISK register related to the apartment building construction.	Yes	Yes	Yes	Serpella et al., (2014)
20.2	Develop the appropriate RISK measuring system related to the apartment building construction.	Yes	Yes	Yes	Serpella et al., (2014)
20.3	Study and select suitable RISK evaluation for the above.	Yes	Yes	Yes	Serpella et al., (2014)
20.4	The study investigates and identifies the suitable system for responding to RISK.	Yes	Yes	Yes	Serpella et al., (2014)

According to Table 4.3, as results of question no 02 under the interview and literature findings that include in the questionnaire survey paper as sub-factors to obtain data collection from the respective selected sample population as described under the sub section of 3.6.5.

In connection to the above question 01 and 02 of the preliminary interview, Table 4.4 summarise the final response results of the main factors and therein sub factors.

Table 4.4: Responded main factors and sub-factors by interviewees and authors

Main Factor No.	Description of Main Factor	Sub Factor No.	Description of Sub Factor
1	Develop a process approach toward TQM	1.1	Conduct the TQM training and education for apartment construction employees.
		1.2	Invest the time and money for the above training and education programmes.
2	Management commitment and leadership for TQM	2.1	Management commitment and leadership for implementation of TQM in apartment construction.
		2.2	Evaluate the benefits and advantages of TQM implementation in apartment building construction.
3	Develop Education and Training	3.1	Conducting technical and management training programs for apartment building construction employees.
4	Develop Teamwork	4.1	Develop the inter-divisional positive relationship within the organization (Apartment building construction).
5	Customer Service	5.1	Priority to resolve matters related to the external customers, who are interested to buy apartments.
		5.2	Provide first time right solutions for matters related to the internal customers (employees) of the organization.
6	Development of Quality culture within the organization of apartment building construction	6.1	Allocate money for quality in the annual budget of the organization of apartment building construction.
		6.2	Allow the sufficient time for quality
		6.3	Implement the "5S " concept within the

			organization of apartment building construction.
7	Prepare project quality plans for all levels of work	7.1	Prepare project quality plans for all levels of activities related to the apartment building construction work.
		7.2	Implement, practice, and follow the quality plan in apartment building construction.
		7.3	Review the feedback related to the quality plan of the above activities.
8	Development of process management	8.1	Every employee should aware of the organizational Vision and Mission of apartment building construction.
		8.2	Every employee should aware of the organizational Goals and Objectives of apartment building construction.
9	Rate of successful tenders or quality contractor selection	9.1	Maintaining sub-contractors database in apartment building construction projects.
		9.2	Implement the sub-contractor evaluation and selection criteria for apartment building construction projects.
10	Development of Supply chain management	10.1	Maintaining material manufacturers and suppliers database for apartment building construction projects.
		10.2	Update the manufacturers' and suppliers' awareness about the material quality on the above projects.
		10.3	Monitoring of manufacturers and suppliers continues positive improvements for quality on the above projects.
		10.4	Improve the manufacturers' and suppliers' general practice about the work on time.
11	Generate awareness	11.1	Implementation of PLAN, DO, CHECK, ACTION practice in apartment building construction projects.

12	Obtain the clients' commitment to quality	12.1	Obtain the client feedback on quality in apartment building construction.
13	Use the guidelines of construction industry-specific factors	13.1	Practice using quality codes, standards, drawings, conditions and specifications.
14	Encourage the continuous improvement of all work activities	14.1	Involvement to conduct research and development for work activities in apartment building construction.
		14.2	Evaluate and implementation of new ideas and innovations in apartment building construction.
15	Developing of statistical methods for Information analysis	15.1	Maintaining of data record system for TIME, COST, and QUALITY construction activities in apartment buildings.
		15.2	Practising analysing the data and evaluating the result for the above work activities.
16	Employee empowerment and involvement in the final product	16.1	Everyone should responsible for the product of the apartment building as planned.
		16.2	Encourage the employees towards creating innovation and value engineering ideas for apartment building work.
17	Develop an open communication system within the organization	17.1	Develop the information transmission system from top to bottom & bottom to top within the organization.
18	Develop Human resources management	18.1	Encourage the employees to further higher education and carrier developments activities.
		18.2	Develop and execute an employee evaluation system for promotions and increments in the apartment building construction sector.

19	Develop Work safety	19.1	Study and prepare an appropriate SAFETY plan for Apartment building construction projects.
		19.2	Identify and nominate the emergency assembling locations in Apartment building projects.
		19.3	Allocating of sufficient budget for Work Safety in Apartment building construction projects.
		19.4	Encourage the employees to use Personal Protective Equipment in Apartment building construction projects.
		19.5	Maintaining accident report register in Apartment building construction projects.
20	Develop RISK Management	20.1	Encourage employees to maintain RISK register related to the apartment building construction.
		20.2	Develop the appropriate RISK measuring system related to the apartment building construction.
		20.3	Study and select suitable RISK evaluation for the above.
		20.4	The study investigates and identifies the suitable system for responding to RISK.

As a result of Table 4.5, the above said 20 main factors and therein sub factors directly to the questionnaire survey as secondary data collection.

4.3 Rate of Response to Questionnaire Survey

According to the sub section 3.6.5 of extraction of sample, the questionnaires were distributed among the 40 no's of selected two categories of apartment building contractors and consultants/owners who are attached to the apartment buildings construction in Sri Lanka. Concerning the total response of the above stakeholders including both categories, 32 no's received with relevant rating results and it is an 80% rate of response out of 40 as described in Table 4.5.

Table 4.5: Status of questionnaire response

No.	Classification of Questionnaires Distribution	Issued	Responded	
1	Apartment building contractors	20	18	90%
2	Consultants/Owners who are attached to the apartment building construction	20	14	70%
TOTAL		40	32	80%

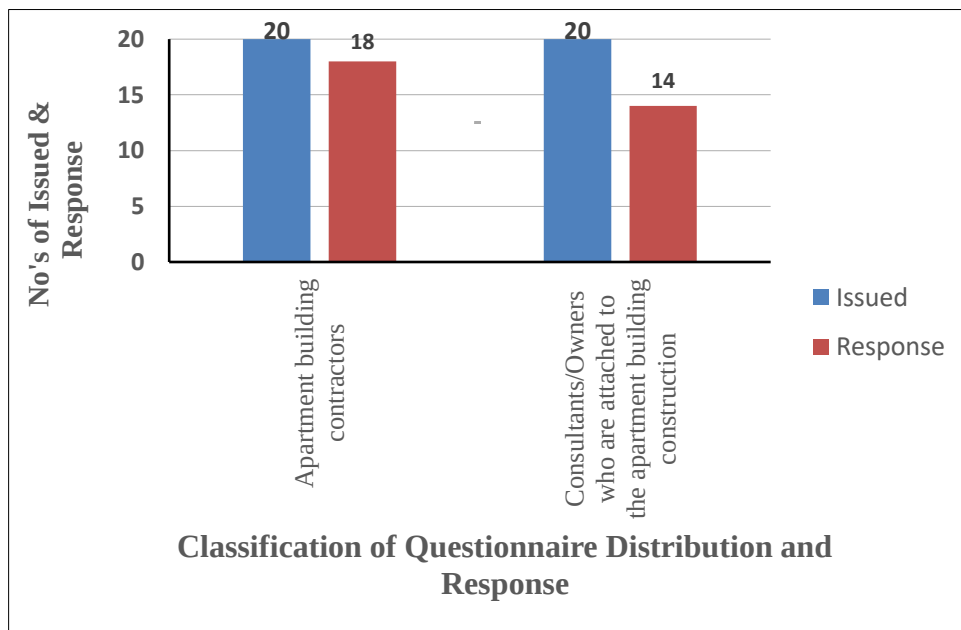


Figure 4.1: Graphical status of questionnaire response

Accordance to Table 4.5 and Figure 4.1, illustrated the issue and response rate of two categories under the selected sample out of the total population. Along with the above results, both categories are responded under the different rates including a 90% response rate achieved by the contractor's category and a 70% response rate achieved by the consultant's category who are attached to the construction of semi-luxury apartment buildings in Sri Lanka.

4.4 Level of Importance and Present Level of Practice of TQM Main Factors that Enhance the Quality of Semi-Luxury Apartment Construction Process to Ensure Customer Satisfaction: Questionnaire Survey Findings

The overall result analysis of data calculation, which is related to the questionnaire survey of this research, has gradually been demonstrated and discussed in this subchapter. Similarly, those results were categorised under the relevant different respondent categories as described in the previous chapter. In addition to the above, these results are classified and ranked under the basis of RII calculation. Even more, the ranking classification of final RII results mainly depends on the parameters given below.

- Level of Importance for your organization
- Level of presently practising performance in your organization

Table 4.6: Classification of RII results of main factors and sub factors

No.	Description of Main Factors and Sub Factors	Overall RII Results		Overall RII Ranking	
		Importance Level	Practice Level	Importance Level	Practice Level
13	Use the guidelines of construction industry specific factors	0.925	0.869	1	1
	13.1 Practice to use quality codes, standards, drawings, conditions and specifications	0.925	0.869		
11	Generate awareness	0.913	0.488	2	14
	11.1 Implementation of PLAN, DO, CHECK, ACTION practice in Aprmt: Buil: Constr: projts:	0.913	0.488		
4	Develop Team work	0.906	0.531	3	13
	4.1 Develop the inter divisional positive relationship with in the organization (Aprmt: Bulg: Constrn:)	0.906	0.531		

Table 4.6: Continue

Table 4.6: Continue

No.	Description of Main Factors and Sub Factors	Overall RII Results		Overall RII Ranking	
		Importance Level	Practice Level	Importance Level	Practice Level
7	Prepare project quality plans for all levels of work	0.885	0.583	4	10
	7.1 Prepare project quality plans for all levels of activities related to the Aprmt: Buil: Constr:	0.888	0.763		
	7.2 Implement, practice and follow the quality plan in Aprmt: Buil: Constr:	0.888	0.588		
	7.3 Review the feedbacks related to the quality plan of above activities	0.881	0.400		
1	Develop a process approach towards to TQM	0.878	0.338	5	20
	1.1 Conduct the TQM training and education for aprmt: constr: employees	0.881	0.356		
	1.2 Invest the time and money for above training and education programmes	0.875	0.319		
19	Develop Work safety	0.876	0.533	6	12
	19.1 Study and prepare a appropriate SAFETY plan for Apartment building construction projects	0.906	0.656		
	19.2 Identify and nominate the emergency assembling locations in Apartment building projects	0.856	0.388		
	19.3 Allocating of sufficient budget for Work Safety in Apartment building construction projects	0.900	0.556		
	19.4 Encourage the employees to use of Personal Protective Equipments in Aprmt: Buil: Constr:	0.881	0.725		
	19.5 Maintaining of accident report register in Aprmt: Buil: Constr: projects	0.838	0.338		
2	Management commitment and leadership for TQM	0.875	0.363	7	19
	2.1 Mgt: commitment and leadership for implementation of TQM in aprmt: constr:	0.888	0.394		
	2.2 Evaluate the benefits and advantages about TQM implementation in Aprmt: Bulg: Constr:	0.863	0.331		
5	Customer service	0.872	0.647	8	6
	5.1 Priority to resolve matters related to the external customers, who are interested to buy apartments	0.863	0.825		
	5.2 Provide first time right solutions for matters related to the internal customers (employees) of	0.881	0.469		
16	Employee empowerment and involvement for final product	0.872	0.431	8	15
	16.1 Every one should responsible for final end product of apartment building as planed	0.888	0.469		
	16.2 Encourage the emlyes: towards to create innovation and value enging: ideas for Aprmt:	0.856	0.394		
12	Obtain the clients commitment for quality	0.869	0.694	10	4
	12.1 Obtain the client feedbacks on quality in Aprmt: Buil: Constr:	0.869	0.694		

Table 4.6: Continue

No.	Description of Main Factors and Sub Factors		Overall RII Results		Overall RII Ranking	
			Importance Level	Practice Level	Importance Level	Practice Level
8	Development of Process management		0.853	0.400	11	16
	8.1	Every employees should aware about the orgsnl: Vision and Mission of Aprmt: Buil: Constrn:	0.856	0.438		
	8.2	Every employees should aware about the orgsnl: Goals and Objectives of Aprmt: Buil: Constrn:	0.850	0.363		
3	Develop Education and Training		0.850	0.638	12	7
	3.1	Conducting of technical and management training programs for Aprmt: Bulg: Constrn: employees	0.850	0.638		
6	Development of Quality culture within the orgazn: of Aprmt: Buil: Constrn:		0.850	0.742	12	2
	6.1	Allocate money for quality in annual budget of organization of Aprmt: Buil: Constrn:	0.850	0.625		
	6.2	Allow the sufficient time for quality	0.888	0.775		
	6.3	Implement the " 5S " concept within the organization of Aprmt: Buil: Constrn:	0.850	0.800		
14	Encourage the continuous improvement for all work activities		0.844	0.384	14	17
	14.1	Involvement to conduct research and development for work activities in Aprmt: Buil: Constrn:	0.825	0.394		
	14.2	Evaluate and implementation of new ideas and innovations in Aprmt: Buil: Constrn:	0.863	0.375		
15	Developing of statistical methods for Information analysis		0.844	0.628	14	8
	15.1	Maintaining of data record system for TIME, COST, QUALITY constrn: activities in Aprmt:	0.863	0.781		
	15.2	Practicing of analyse the data and evaluate the result for above work activities	0.825	0.475		
18	Develop Human resources management		0.844	0.597	14	9
	18.1	Encourage the employees for further higher education and carrier developments activities	0.825	0.563		
	18.2	Develop and execute empye evaluation system for promotions and increments in Aprmt: Buil:	0.863	0.631		
17	Develop the open communication system with in the organization		0.838	0.669	17	5
	17.1	Develop the information transmission system from top to bottom & bottom to top within the	0.838	0.669		
9	Rate of successful tenders or quality contractor selection		0.831	0.731	18	3
	9.1	Maintaining of sub-contractors data base in Aprmt: Buil: Constrn: projects	0.831	0.775		
	9.2	Implement the sub-contractor evaluation and selection criteria for Aprmt: Buil: Constrn:	0.831	0.688		

Table 4.6: Continue

Table 4.6: Continue

No.	Description of Main Factors and Sub Factors	Overall RII Results		Overall RII Ranking	
		Importance Level	Practice Level	Importance Level	Practice Level
20	Develop RISK Management	0.827	0.383	19	18
	20.1. Encourage employees to maintain RISK register related to the apartment building construction	0.831	0.394		
	20.2. Develop the appropriate RISK measuring system related to the apartment building construction	0.800	0.413		
	20.3. Study and select suitable RISK evaluation for above	0.825	0.338		
	20.4. Study, investigate and identify the suitable system for respond to RISK	0.850	0.388		
10	Development of Supply chain management	0.808	0.552	20	11
	10.1. Maintaining of material manufactures and suppliers data base for Aprmt: Buil: Constn:	0.794	0.775		
	10.2. Update the manufactures and suppliers awareness about the material quality on above projts:	0.800	0.556		
	10.3. Monitoring of manufactures and suppliers continues positive improvements for quality on	0.819	0.425		
	10.4. Improve the manufactures and suppliers general practice about the work on time.	0.819	0.450		

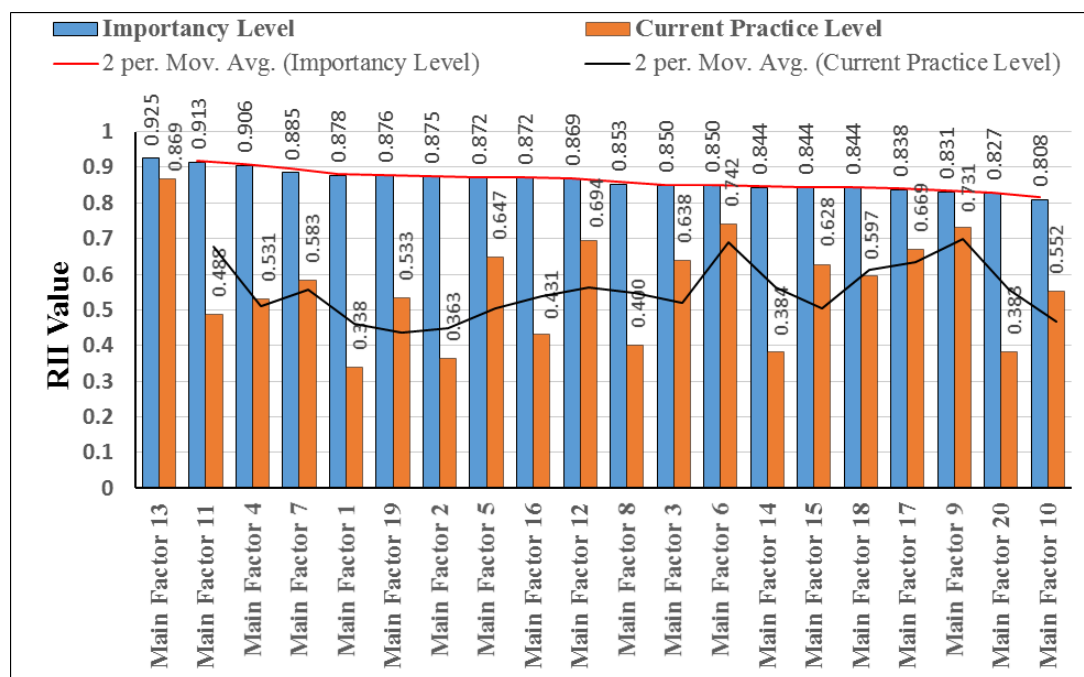


Figure 4.2: Overall behaviour on RII results of main factors

Table 4.6 and Figure 4.2 illustrate that both organizations are realised that, the main factor 13 of using the guidelines of construction industry-specific factors is very important by recording a higher importance level of 0.925 RII value to ensure the customer satisfaction in the semi-luxury apartment construction process by TQM main factors. Similarly, they believe that main factor 13 is mostly practising the main factor in the industry by witnessing 0.869 of the highest RII value for the current practising level. However, all of the main factors are recorded more than

0.800 RII value for the level of importance of main factors and both organizations are averagely express that, level of presently practising performance of above mentioned main factors are varying as 0.338 of RII value for minimum and 0.869 for maximum.

4.4.1 Compare and contrast the results of the main factors and sub factors

Relation to Table, 4.6 and Figure 4.2 illustrated that RII results in the behaviour of main and sub-factors in this research and it can review and discuss the variations with respect to the two different perspective parameters of contractor and consultant organisations' responded results.

- Main factor 13 - Use the guidelines of construction industry-specific factors

This Main factor implied that the use of specifications, drawings, standards, and relevant tests is important for the construction of semi-luxury apartments in Sri Lanka. With the connection to the above, Table 4.6 and Figure 4.2, verified the importance of the use of the above specific factors in both organisations in Sri Lanka. Due to that, it was ranked as the highest importance level in the overall rating with a 0.925 RII value in Table 4.6 and they realised that it is a very essential requirement. In the same way, the present practice level also recorded the highest with a 0.869 RII value. In the meantime, different authors provide evidence for the same as follows.

Arditi and Gunaydin (1997) stated that compliance with codes and standards should be an issue addressed early in the design phase. Arditi and Gunaydin (1997) further stated without early identification of the appropriate codes and standards, reworking

plans and specifications can result in considerable cost and delay. Therefore, Arditi and Gunaydin (1997) advise that design professionals must be knowledgeable about the provisions codes and standards before starting a new design of work.

- Main Factor 11 - Generate awareness

In accordance with Table 4.6 and Figure 4.2, elaborately express how both organisations are responding to the above main factor by considering the therein-single sub factor regarding importance level recorded as second-highest by 0.913 of RII value. However, on the other hand, it was ranked in 14th place with respect to the current practice performance indicated as an overall RII value of 0.488 in both organizations and it is evident by the following literature findings.

- Main Factor 04 - Develop Teamwork

Questionnaire survey data analysis results express that, the development of the inter-divisional positive relationships is very essential for semi-luxury apartment building construction organisations. It is shown in Table 4.6 and Figure 4.2 and ranked as the third level of importance in both organisations and the relevant RII value is 0.906. On the other hand, presently practising level of a particular main factor is recorded considerably low-level rate as 0.531 of RII value by same organisations and ranked 13th place out of 20. It is implied that current practice performance needs to be improved under the main factor as well as their in sub factor.

Concerning the literature review, Arditi and Gunaydin (1997) contended that teamwork among parties is essential to reach design quality as well as effectiveness of the construction phase.

- Main Factor 07 - Prepare project quality plans for all levels of work

Preparing quality plans for work, implementing quality plans in work, and reviewing the feedback of quality plans are essential for semi-luxury apartment building construction in Sri Lanka. Further to the above, it is verified by an overall RII value of 0.885 as mentioned in Table 4.6 and Figure 4.2. When it is focused on the three numbers of sub factors associated with the main factor, both organisations are recorded a high range of RII values (0.881 – 0.888) and again conform to the

importance of those main and sub-factors in order to maintain the research aim. However, different to the above, the current practising performance of above last two sub-factors (7.2 and 7.3) are recorded rather low range of RII value as 0.400 – 0.588 and it is realised that contractors and consultants are not much concerned about the following the quality plans and consideration of feedback for the same. Nonetheless, the first sub factor related to the preparation of quality plans is that both organisations are very keen on the current practice in the industry.

Metri (2005) further contended that clarity of detail design, schedules and cost estimations, design evaluation, constructability of design, and control of design activity is part of design quality management and an important aspect of TQM.

- Main Factor 01 - Develop a process approach toward TQM

According to the results of Table 4.6 and Figure 4.2, that main factor 01 recorded overall importance level-recorded 0.878 value of RII and it is ranked under the fifth level out of 20 main factors, which represent both organisations. When focusing on the current practice level of above main factor 01, recorded that 0.338 of RII values and it is placed last under the ranking level. Therefore, it is realised that main factor 01 and therein sub factors need to be improved to practice in both organisations. To improve the practice level of the main factor 01, sub factor 1.1 and 1.2 provides solutions and it is evident by 0.881 of RII values indicate the importance level of conducting TQM training programs (i.e. sub factor 1.1) and 0.875 indicate that essential of invest the sufficient money for the same.

According to the literature findings that Panuwatwanich and Nguyen (2017) further included, external customer satisfaction can be achieved by implementing TQM. Same as above Burati, Matthews, and Kalidindi (1991) contended that companies that developed their own corporate TQM approach had greater success in integrating the training into the job function than companies using a singular TQM approach from a consultant.

- Main Factor 19 - Develop Work safety

In connection with Table 4.6 and Figure 4.2, provides the RII results of the above main factor 19 and therein 5 sub-factors. According to those records, the overall

results of the importance level indicated a 0.876 RII value for both organisations and it is placed under the 6th importance ranking level. When focusing on the next parameter of the current practice level of those factors indicated 0.533 of the overall level of RII value by representing both organisations and it is expressed that 12th ranking place out of 20 main factors. Therefore it is the contrast that, both organisations realised the importance of this main factor, but they were unable to accomplish to achieve the practice performance up to the importance level and it is advisable to improve the practice of main factor 19 and therein sub factors.

According to the literature findings related to the above main factor, Kwan (2016) expressed that quality is for meeting clients' requirements and is expected to have direct revenue. However, Kwan (2016) further stated client of safety is the general staff members and workers; revenue is largely un-measurable, and effectiveness is only faintly discernible through accident statistics. Therefore Deming (as cited in Kwan, 2016) stated that re-inspection of TQM principles in safety terms must be done radically down to the original fourteen principles do it, proposer. Meantime Husrul (as cited in Wanberg, Haper, Hallowell & Rajendran, 2013) and Wanberg et al. (2013) stated that positive relationship between quality and safety in TQM programs and indicated that safety leads to quality. Husin, Adnan, and Jusoff (2008) contended that "TQM adds new emphasis to the idea that "doing it right" includes doing it safely".

- Main Factor 02 - Management commitment and leadership for TQM

Table 4.6 and Figure 4.2 illustrated that the overall importance ranking level as 7 for this main factor 02 and its related RII value is 0.875 and there 2 sub-factors recorded quite similar values as 0.888 and 0.863 respectively. However, the present practice status of the above main factor and therein sub-factors are recorded very low rate than the importance. According to that, the overall practice performance of the RII value is 0.363 and it is ranked 19th level for these factors. Because of that, it is strongly advised to both organisations to be more concerned about practising these factors within the environment of construction of Sri Lankan semi-luxury apartment buildings.

According to the literature, Lakhe and Mohantr (1994) stated management commitment is a very essential principle for the implementation of TQM in the construction industry and effective leadership can enforce to improve this implementation process in the same industry. Meantime, Metri (2005) provide evidence to the above and stated initiatives of TQM implementation have failed to fulfil their potential due to a lack of senior management commitment to implement. Metri (2005) further stated that top management commitment is very essential to implementing TQM in any industry, without it; there is no need to further proceed with TQM.

- Main Factor 05 - Customer service

This is a very serious factor affecting the research aim and objectives as described in chapter one. According to the data analysis express that, the total population of Sri Lankan contractors and consultants who have attached construction of semi-luxury apartments, realised and understand the importance of customer service for their organizations and it is categorised and ranked as an overall RII value of 0.872. Concerning the above main factor, two sub-factors are maintaining the good importance RII value range of 0.863-0.881 representing both organisations and its importance level is 8. Different from the above another parameter of the ranking scale, which is presently practising performance of customer service in relevant organizations, resulted that 0.647 of overall RII value and recorded as 6th level out of all 20 main factors.

The sub-factors representing that external customer service and the second one representing internal customer service and external customer service recorded a high overall value of RII of 0,825 for current practising performance in both organisations. According to Table 4.6 and Figure 4.2, the second sub factor of internal customer service recorded a rather low range of RII value as 0.469 than the external customer service. Therefore, when considering all these results realised that the Sri Lankan semi-luxury apartment building construction industry should have given more priority to external customer service same as internal customer service.

Meantime Erande and Pimplikar (2016) stated that customer satisfaction is the

backbone of TQM and it is recorded as the highest index value for construction companies. Oakland (as cited in Erande & Pimplikar, 2016) found that giving attention and meeting customer needs is paramount to customer loyalty, which ultimately resulted in better customer relationships. Similar to the above, Amaniampong, Salakpi, and Bonye (2014) contended that TQM programs are oriented towards to achievement of comprehensive customer satisfaction.

- Main Factor 16 - Employee empowerment and involvement in the final product

According to Table 4.6 and Figure 4.2, this main factor consists of two sub factors. The first parameter of importance levels of the above main factor indicated that 0.872 of good RII value and recorded same RII ranking level of eighth similar to previous main factor by both organisations. Different to the above, the same organisations indicated that very low RII value for current practice performance as 0.431 value with 15th ranking level. When considering the all above results it is expressed that both organisations were very much concerned about the impotence of the above main factors and therein sub factors. However, they could not able to achieve the current practice performance level up to the importance level. Therefore, it is advisable to improve the current practice performance level to achieve the ultimate aim of this research.

Talib et al. (2010) noticed that Demings claims involvement and participation of employees at all levels to improve the quality of the current and future product or service. Sadikoglu and Zehir; Ooi et al. (as cited in Talib et al., 2010) found that “even non-managerial employees can make significant contributions when they are involved in quality improvement processes, and decision-making processes, and policy making issues”. Talib et al. (2010) contended, that organisations should utilize all employee’s skills and abilities to gain business performance. According to Waleed (2012) “empowerment is the process of enabling or authorizing an individual to think, behave, take action, and control work and decision-making in independent ways”. Empowering employees with good training play a vital role in an organisation's high-quality service, which will attain customer satisfaction (Waleed, 2012).

- Main Factor 12 - Obtain the clients' commitment to quality

Obtaining client feedback for quality is a very prominent requirement to ensure customer satisfaction with regard to the research aim. Table 4.6 and Figure 4.2 indicated a good RII value of 0.869 and ranked in 10th level under the important parameters by both organisations. According to the same table and figures, the overall practice performance recorded an RII value of 0.694 and it is ranked under the fourth level of current practice performance. Under the above circumstances, it is recognised that both organisations are very keen on the client's commitment to quality before finalising of semi-luxury apartment construction industry in Sri Lanka.

Oakland and Marosszeky (2006) identified that “an organization must recognize, throughout its ranks that the purpose of all work and all efforts to make improvements is to serve the customers better”. The most important customers are the external ones, but quality chains can break down at any point in the flow of work. Oakland and Marosszeky (2006) especially noticed that “internal customers therefore must also be well served if the external ones are to be satisfied”.

- Main Factor 08 – Development of process management

Table 4.6 and Figure 4.2 expressed that 0.853 of overall RII value and indicated 11th ranking level for main factor 08 and therein 2 sub-factors under the category of important level. As an illustration of those results, it appears both organisations have very much understanding of the importance of those sub-factors in order to ensure customer satisfaction in the Sri Lankan semi-luxury apartment building construction industry. When talking about the present practice performance of above mentioned main factors and sub-factors both organisations obtain a very low overall RII value of 0.400 and it is realised that both organisations' employees are less aware or less knowing about the vision, mission, goals and objectives of their organisation.

Different to the above Erande and Pimplikar (2016) express their findings regarding process management contended that construction drawings and specifications are important and further stated that “check sheets and clarity of work processes play a significant role in enhancing the quality of construction work”.

- Main Factor 03 - Develop Education and Training

According to Table 4.6 and Figure 4.2, the importance level for main factor 03 recorded an overall RII value of 0.850 and ranked under the 12th level. Those results expressed that both organisations understand the requirement of this main factor including therein sub factors. Because of development education and training is essential to ensure customer satisfaction towards this research aim. Different to the above, the current practice level of main factor and sub-factors are recorded at 0.638 RII value and but it is ranked the seventh level out of 20 main factors. However, the present practising performance value of this factor is slightly less than the overall importance level weighted by both organizations. Therefore, it is realised that the development of education and training needs to be improved under the particular organisations in Sri Lanka.

Meantime Harel, Gupta, Shitole, Nankar and Shelake (2016) research found that, for implementing TQM in residential buildings quality control tools like cause and effect diagrams, checklists and histograms are very useful. Furthermore, Harel et al. (2016) contended that the above main intention is to implement the TQM concept in residential buildings with education and training in QC tools. In addition to the above Saeed and Hasan (2012) argue that lack of education and training is also one of the reasons why TQM would fail in the construction sector. As a result of that Saeed and Hasan (2012) stated implementation of TQM in construction depends on certain activities especially education and training techniques and management aspects.

- Main Factor 06 - Development of Quality culture within the organization of apartment building construction

Table 4.6 and Figure 4.2 demonstrated the behaviour of the above-mentioned main factor and therein three sub-factors. Both organisations recorded 0.850 of overall RII value and it is ranked 12th level same as the previous main factor for importance level. It was understood that both contractor and consultant sectors believe that how much importance above the main factor and therein sub factors. As well as the second parameter of currently practising performance of this main factor and therein sub-factors in the same organisation have been obtained a considerably high range of

practice performance. It is recorded as an overall RII value of 0.742 and indicated the second-highest-ranking level for present practice performance. When considering all these circumstances, it can be declared that these sub-factors, which are found through preliminary interviews, are commonly practised activities in the Sri Lankan semi-luxury apartment building construction industry.

Pheng and Teo (2004) stated that the majority of contractors believe that TQM is an extra cost and “but they do not realize that it is not the quality that costs but rather non-conformance” to expensive quality. Metri (2005) argue that the failure of implementation of TQM is attributed to a lack of developing and sustaining a quality-oriented culture and a mismatch of organisational culture, Metri (2005) further explains that fundamentally TQM requires a new culture and in construction industry organisation culture and project culture both co-exist and need integration.

- Main Factor 14 - Encourage the continuous improvement of all work activities

In connection with the results of RII value in Table 4.6 and Figure 4.2 express that overall importance level results of above main factor and sub factors as 0,844 of RII value and it is indicated 14th level. However, different to the above results current practice performance recorded very low values of RII results for above same main factor by contractor and consultant’s organisations. According to that current practice performance, the RII value is 0.384 and its ranking level is 17th out of 20. When considering above those facts of results, it is realised that both organisations should more concentrated about the implementation of R & D activities and encourage to execution of innovations for ensuring the customer satisfaction in the Sri Lankan semi-luxury apartment construction process.

Based on the literature reviews subjected to the above main factor and sub-factors that Hsien Kuo and Lin Kuo (2010) found that continuous quality improvement and information refer to the firm’s strategies in continuous quality improvement, including obtaining customers feedbacks, and the efficiency of feedback gathering, encourage employees, obtaining of quality improvement ideas, as well as providing rewards for quality improvement innovations. Different to the above Sadikoglu and

Zehir (as cited in Talib, Rahman and Qureshi, 2010) explains that “continuous improvement and innovation, which is the most important part of services, means searching for never-ending improvements and developing processes to find new or improved methods in the process of converting inputs into useful outputs”. Further to the above Hyland, Sadikoglu and Zehir (as cited in Talib et al., 2010) continue that it “helps in reducing the process variability thereby continuously improving the output performance”. Connecting to the above Corbett and Rastrick (as cited in Talib et al., 2010), Kakkad and Ahuja (2014) asserted TQM is the best way to improve organisational performance continuously improve the performance activities. Kakkad and Ahuja (2014) further say “continual improvement drives an organisation to be both analytical and creative in finding ways to become more competitive”.

- Main Factor 15 - Developing of statistical methods for Information analysis

Reference to Table 4.6 and Figure 4.2 illustrated the RII calculation results of this main factor and therein two sub-factors. According to that, RII overall value was recorded; as 0.844 for the importance parameter and its ranking level is 14th level same as the previous main factor. When further analysing two sub-factors that recorded a slightly similar range of RII values (0.825 and 0.863) for the importance parameter. On the other hand, in relation to the current practice performance of the above main factors indicated overall RII value as 0.628 and its overall ranking level is 8th as per the related table and figures.

Metri (2005) stated that information analysis consist of an evaluation of various policies and strategies, quality audit, analysis of the cost of quality, department/function performance evaluation, and employee and supplier performance evaluation. Metri (2005) further say to maintain a true customer focus, an organisation must ensure prompt feedback of customer survey results to appropriate functional areas for effective actions. Connected to the above Prajogo (as cited in Talib et al., 2010) also found the significance of information analysis in TQM practice on quality performance. Furthermore, Teh et al. and Lee et al. (as cited in Talib et al., 2010) information and analysis also help an organisation to ensure the

availability of high quality, timely data and information for all users like employees, suppliers and customers.

- Main Factor 18 - Develop Human resources management

This is a very essential and effective factor for productivity and quality of work. Table 4.6 and Figure 4.2 indicated the overall average RII value as 0.844 and its ranking level was recorded as 14th same as the previous two main factors for the important parameter. When it comes to the second evaluation parameter of present practising performance of above main and sub factor illustrated that 0.597 of RII value and it is ranked as the ninth level under the overall current practice performance parameter.

In connection to the literature by Alotaibi, Yusoff and Islam (2013) stated human resources has a crucial role in the implementation process as the middle managers and the employees need to be motivated in an in-depth manner. Alotaibi et al. (2013) further stated with the help of quality assurance the employee's attitude as well as a mindset has to be modified for a positive outcome. In connection to the above Alotaibi et al. (2013), contended "TQM cannot be forced upon employees and management alike as its voluntary acceptance must be throughout the company". Yang (as cited in Talib et al., 2010) further contended human resources management as TQM practice significantly correlated with customer satisfaction.

- Main Factor 17 - Develop an open communication system within the organization

In accordance with Table 4.6 and respective Figure 4.2 that, the overall RII value was recorded as 0.828 and maintained the ranking level as 17th under the importance parameter of this main factor and its sub factor. As per the second parameter named as present practice performance in the same table, illustrated that, 0.669 of RII value, and indicated fifth ranking level for the present practice performance level. Considering the results of both parameters obtained by both organisations, it is understood that the main factor and therein sub-factors are very important to ensure customer satisfaction in the construction of semi-luxury apartments construction process.

As per the literature findings that Kakkad and Ahuja (2014) found that effective communications play a large part in maintaining morale and in motivating employees at all levels. Kakkad and Ahuja (2014) further contended that communications involve strategies, methods, and timeliness. Connected with the above Kakkad and Ahuja (2014) say that these elements are considered so essential to TQM that many organisations define them, in some format, as a set of core values and principles on which the organisation is to operate. In addition to the above author, Waleed (2012) argues that communication happens when the management is ready to listen and accept employees. Waleed (2012) further included that in order to do, management expectations should coincide with those of the organisation's employees. Concerning Armstrong (as cited in Waleed, 2012) communication should be more personalized and in parallel with the employee's needs.

- Main Factor 09 – Rate of successful tenders or quality contractor selection

Table 4.6 and Figure 4.2 indicated that 0.831 of RII value for the overall value of the importance of the above main factor and therein two sub-factors elaborately expressed the same values for an important parameter. According to the same table, the current practice performance is recorded as 0.731 of the overall RII value and it is ranked 3rd place out of 20 main factors. According to those results, it is realising that the rate of successful tendering and selection of quality contractors is very important to ensure customer satisfaction to enhance the quality of the semi-luxury apartment construction process in Sri Lanka.

Meantime under the findings of the literature that JHA and IYER (2006) stated aggressive competition sometimes forces the bidders to quote low for the project. The same authors suggested that by implementing TQM for selection criteria those weaknesses could be avoided on a long-term basis. Similar to the above Kumaraswamy and Walker (as cited in Alotaibi, Yusoff & Islam, 2013) contended that prior traditional contractor competitiveness studies stress tender price and relatively ignored the evaluation of contractor's performance attributes. As a result of that Hatush and Skitmore (as cited in Alotaibi, Yusoff & Islam, 2013) suggested that contractor competence should be evaluated on a variety of factors like financial

soundness, technical ability, and management capacity, reputation and safety performance by using TQM concepts.

- Main Factor 20 - Develop RISK Management

According to the Table 4.6 expressed that, this main factor consists of 4 sub-factors and those are recorded with fairly similar RII values in-between 0.800 to 0.850 for importance level as a result of that, the overall RII value is indicated as 0.827 in the same table and overall ranked as 19th place out of 20 main factors.

On the other hand, regarding the second parameter of present practice performance level recorded less RII value range of 0.338 – 0.413 for same sub factors rather than importance level. Because of that, the overall present practice performance level indicated a 0.383 RII value. Finally, it is realised that the above main factor including therein sub factors has to be more practised by both organisations for ensuring customer satisfaction to enhance the quality of the semi-luxury apartment construction process in Sri Lanka.

However, the literature findings related to the above, Serpella, Ferrada, Howard, and Rubio (2014) stated that less awareness of risk management in many construction projects affects the effectiveness of project management functions and the end project performance.

- Main Factor 10 - Development of Supply chain management

According to Table 4.6 and Figure 4.2, the overall RII value was recorded as 0.808 and it is indicated last important ranking level as per the above table. On the other hand, the current practice performance level indicated as 0.552 of overall RII value for the main factor and slightly similar RII value range maintain by therein sub factors. When considering the overall picture of the above main factors and therein sub factors illustrated that both organisations are very much concerned about the importance and they provided their consent to be implemented those activities within their organisations.

Concerning the findings of the literature in different contexts that Zakuan et al. (as cited in Rahman and Qureshi, 2010) argue, effective supplier chain management can

be achieved by cooperation and long-term relationship with the suppliers. Zineldin and Fonsson (as cited in Rahman and Qureshi, 2010) supported to above argument and stated development of supplier partnerships and long-term relationships can increase organisational competitiveness and thus improve the performance of TQM. In addition to the above Kanapathy (as cited in IMBEAH, 2012) supplier quality is an important dimension of Total Quality Management as defective incoming materials and parts lead to process and product quality problems. IMBEAH (2012) stated most research identified good supplier relationships as a necessity for maintaining competitive advantage, which leads to quality suppliers for products and services.

4.5 Proposing Guidelines to Enhance the Quality of the Semi-Luxury Apartment Construction Process Using TQM to Ensure Customer Satisfaction

A summary of the sub chapter 4.4, provides a broad discussion about the data analysis and according to those findings, it is observed that significant different results about those main factors subjected to the two areas of parameters indicate the importance level to particular organisations and present practice performance level in the same organisations. In connection to the first parameter expressed that more than 80% of respondents of the questionnaire survey admitted that those 20 main factors and therein-respective sub-factors are important to achieve the research aim.

Therefore, herewith proposed the following guideline, where shown in Figure 4.3 including those main factors and therein sub factors to practice in semi-luxury apartment building construction process in Sri Lankan contexts to ensure the customer satisfaction.

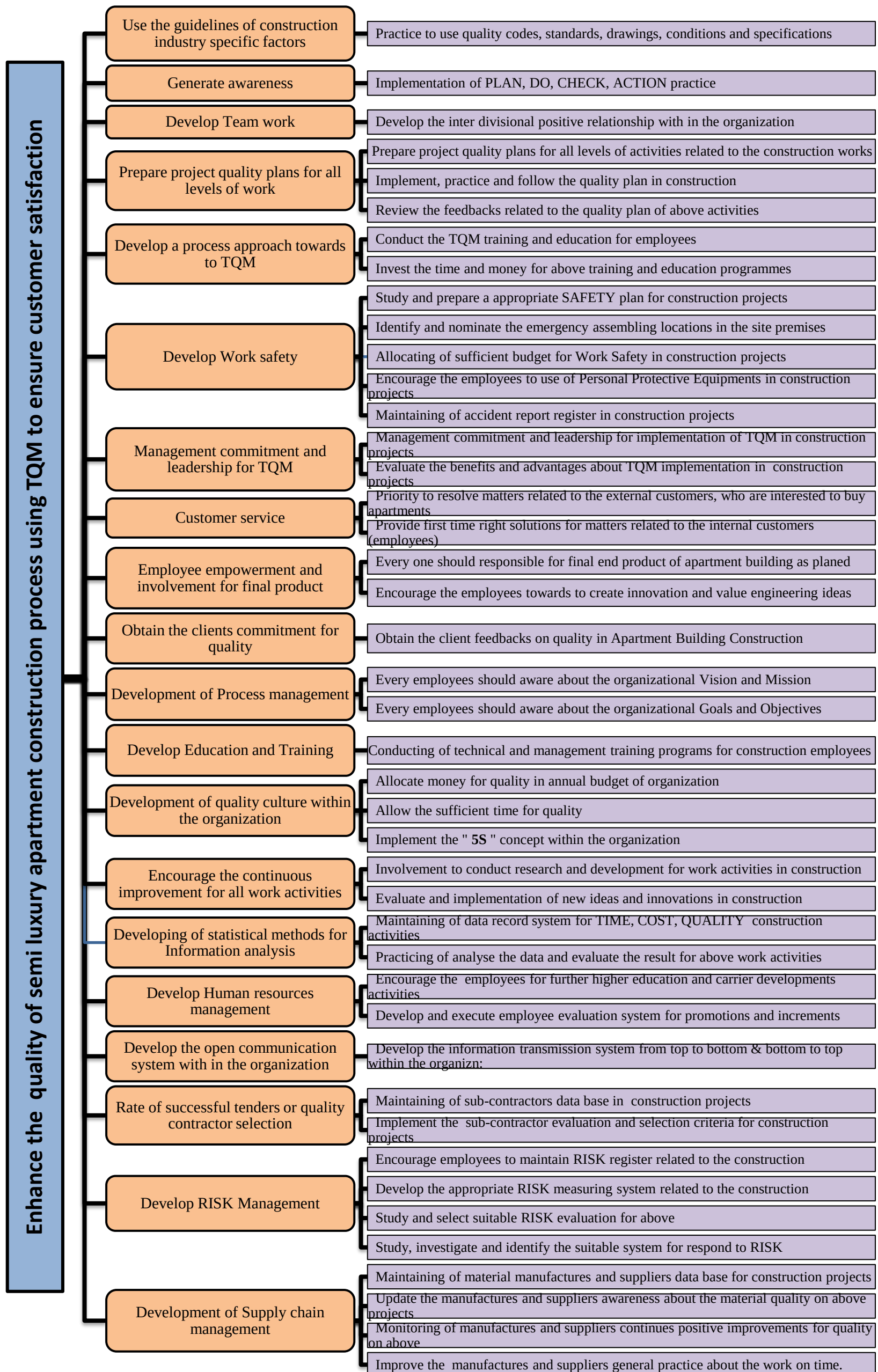


Figure 4.3: Proposed guideline to enhance the quality of semi-luxury apartment construction process using TQM to ensure customer satisfaction

According to Figure 4.3, this proposed guideline contains main factors and therein sub-factors that need to be practically implemented in semi-luxury apartment building projects in order to ensure better results towards customer satisfaction. Same time this is another achievement of the research objective where mentioned in chapter one.

4.6 Summary

According to this chapter on data, analysis and research findings expressed that discussion about the preliminary survey results and rate of response to the questionnaire survey by the selected sample. According to the total response, it is recorded that 60% of responses were received for the preliminary survey. In the same way, 90% of responses were received from contractor organisations and 70% of responses were received from consultant organisations for the questionnaire survey. Further to the above, it is observed that 80% total was achieved from both categories of contractors and consultants who are directly attached to the construction of semi-luxury apartment buildings in Sri Lanka. The next subchapter expresses that analysing of questionnaire survey data by using RII calculation as described in chapter three. Under the data analysis, it is broadly explained, calculates and displays the results of every data including 20 categories of main factors and therein sub-factors to which the sample population responds to. According to the above sub chapter, it is widely compared, contrasted, and discussed about the RII results are subjected to both ends of parameters of importance level and presently practising performance in the semi-luxury apartment construction industry. The final sub chapter contains that, comprehensive and gradually formulated guidelines to follow, for whoever is interested to enhance the quality of the Sri Lankan semi-luxury apartment construction process using of total quality management concept to ensure customer satisfaction.

The above stated final results under chapter 4 forward to the next chapter of conclusion and recommendations to verify and establish the outcomes of this research towards achieving the research aim by satisfying the research objective were described under chapter one.

CHAPTER 5

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This final chapter contains five sub-chapters called introduction, an overview of the research, conclusion, recommendations, and finally further research directions.

According to the above sub-chapters provides a final statement regarding how to accomplish the requirement of research objectives where mentioned in chapter one and recommendations deliver a suitable optimum way of achieving the research aim. The final part of this chapter gives an indication and directions for further studies, which are beyond this research aim.

5.2 Overview of the Research

In accordance with the various literature findings that it was observed, specific research gap for a proper guideline for the adaption of TQM in Sri Lankan semi-luxury apartment buildings construction towards customer satisfaction. To achieve the above requirement, research commenced under the research aim as mentioned under the sub chapter 1.3 and consists of five research objectives as mentioned in the sub chapter 1.4. This research was conducted under the specific metropolitan area of Colombo sub-urban area of Malabe area and Galle municipality area of Sri Lanka under the scope and limitation.

The literature review contributed that vital information from other researches and authors' findings related to this research aim and objectives and found 25 basic principles of TQM. Under the methodology section of this research identified, understand and clarify the methodological framework to conduct this research. The research approach provides an action plan that gives direction and guidance to conduct research systematically and effectively. According to this research approach, the mixed method has been selected to conduct this research as per the research design. Consideration of research behaviour that preliminary interviews and questionnaire surveys implemented as data collection techniques. Similarly, content analysis and relative important index (RII) are followed as data analysis techniques

in this research. As a conclusion of this research introduced that, a new guideline for enhancing the quality of the semi-luxury apartment construction process using TQM to ensure customer satisfaction by achieving the research aim with therein five research objectives.

5.3 Conclusions

As a conclusion of this research, it is required to be measured and verified with the proposed research objectives where mentioned in chapter one for establishing the feasibility of the research aim under the same chapter. Therefore, research objective verification expressing as follows.

- **Objective 01 - Review the Sri Lankan apartment industry, and its commercial classification.**

A definition of the apartment by Kalu and Vikat (2007) stated that an apartment is housing units in a dwelling that has three or more residential units, with at least one unit being on top of another.

According to chapter 2, the Sri Lankan apartment industry started in 1960 and its maximum growth occurred during the period from 2007 to 2017. In addition to the above Sri Lankan apartment classified in the main three categories as super luxury, luxury, semi-luxury, and that classification depended on their facilities, amenities, and services. During the past two years of period, apartment market demand has considerably dropped due to the price hike and the global pandemic situation.

In view of the above-mentioned information, it can be declared that chapter 2 of the literature review fulfils the requirements of research objective 01 and it is one of the achievements of the research aim.

- **Objective 02 - Review and identify the concepts of quality, TQM and the principles of TQM.**

Research objective 02 is directed towards identifying the quality concepts, studying, investigating the TQM, and identifying the principles of TQM. According to the literature findings that the evolution of quality concepts can classify as Quality Inspection, Quality Control, Quality Assurance, and finally was found Total Quality

Management. The basic characteristics of those four quality concepts are broadly discussed in Table 2.4 under chapter 2.

The literature review that, studied and discussed the various definition of TQM and identified basic principles of TQM as top management commitment, customer focus, training and education, continuous improvement and innovation, supplier management, employee involvement, information and analysis, process management, quality system, strategic quality management, design quality management, leadership, benchmarking, quality culture, human resource management, strategic planning, employee encouragement, teamwork, communication and final product and service design.

According to the above information included in chapter 2 of the literature review fulfils the requirements of research objective 02 and it is the achievement of the research aim.

- **Objectives 03 and 04 - Identify the level of importance of TQM's main factors that enhance the quality of the semi-luxury apartment construction process to ensure customer satisfaction.**

Identify the level of the present practice of TQM's main factors that enhance the quality of the semi-luxury apartment construction process to ensure customer satisfaction.

In accordance with the research objectives 03 and 04, it was realised that searching and finding out the above-said objectives are very important to achieve the research aim. Because of that, there are 20 main factors verified out of 25 by interviews that are related to the research objectives 03 and 04. Meantime, 43 sub-factors identified through literature review and taken out from interviews were mentioned under Table 4.4 in chapter 04.

According to the values data analysis technique of RII, the outcome has ranked under the two evaluation parameters to identify the level of importance and level of the present practice of those main factors and therein sub factors concerning the Table 4.6 and Figure 5.1 where mentioned under the chapter 4. According to the above-said tables and figures, it was identified that what are the most important main factors and

least important main factors as well as the most practice performance of main factors and least practice performance of main factors in the semi-luxury apartment buildings construction industry of Sri Lanka.

Following the above, mentioned summary of research objectives 03 and 04 that it is completely fulfilling their requirements and it can be declared that it is another step toward the achievement of the research aim.

- **Objective 05 - Develop a guideline to enhance the quality of the semi-luxury apartment construction process using TQM to ensure customer satisfaction.**

As the last research objective, it is understood that introducing successful guidelines to enhance the quality of the semi-luxury apartment construction process using TQM to ensure customer satisfaction is a final destination of this research. For the purpose of this achievement, the previously mentioned research objectives one, two, three, and four have opened up the path to fulfilling the requirement of research objective five.

Finally, under the sub chapter 4.5 has successfully introduced a guideline, which is containing the main factors and sub factors to be implemented in any construction organisation in order to ensure customer satisfaction in the semi-luxury apartment building industry in Sri Lanka. Similarly, it is realised that chapter 4 of the above research findings and analysis have fulfilled the requirements of research objective 05 and it is the key intention of this research aim where mentioned in chapter one.

5.4 Recommendations

Review back into the whole research findings under the previous chapter, the following recommendations can declare for the betterment of ensuring customer satisfaction by enhancing the quality of the semi-luxury apartment construction process using TQM.

Any organisation of contractor or consultant who is attached to the above industry that herewith recommended to follow the guideline where mentioned under the sub chapter 4.5 have to refer, understand and implement towards to ensure the customer satisfaction through enhancing the quality of semi-luxury apartment construction

process using TQM. In addition to the above, herewith strictly advise to more concern about following most important main factors in the previously mentioned guideline.

1. Use the guidelines of construction industry-specific factors
2. Generate awareness
3. Develop teamwork
4. Prepare project quality plans for all levels of work
5. Develop a process approach toward TQM

5.5 Further Research Directions

This research opens up the path for further research directions towards following directions.

- ✓ Investigate the external customers' perspective on factors affecting customer satisfaction in apartment buildings.
- ✓ Investigate how to use TQM to enhance customer satisfaction in the new normal condition in apartment buildings.

LIST OF REFERENCES

- Ahmed, M. A. H., & Siddiek, A. G. (2012). Strategic quality management in the Arab Higher Education Institutes: A descriptive analytical study. *International journal of business and social science*, 3(24), 90-103. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3181721
- Akhtar, I. (2016). Research Design. Research in Social Science: *Interdisciplinary Perspectives*, 68-84. Retrieved from https://www.researchgate.net/publication/308915548_Research_Design
- Akinci, C., & Saunders, M. (2015). Using questionnaire surveys to gather data for within organisation HRD research. *Research at Birmingham*, 353-365. Retrieved from [https://www.researchgate.net/publication/283329027Using Questionnaire_Surveys_for_Within-Organisation_HRD_Research](https://www.researchgate.net/publication/283329027Using_Questionnaire_Surveys_for_Within-Organisation_HRD_Research)
- Al-Dulaimy, J. M. T., Alkhazraji, F., ALHadeethi, R. H., & Sameer, J. O. (2015). Evaluation of total quality management implementation as engineering practices in Jordanian construction projects. *IOSR Journal of Mechanical and Civil Engineering*, 12(1), 57-65. doi: 10.9790/1684-12125765
- Alghamdi, H. (2016). Toward better understanding of Total Quality Management (TQM). *Journal of Business & Economic Policy*, 3(4), 29-37. Retrieved from http://jbepnet.com/journals/Vol_3_No_4_December_2016/5.pdf
- Al-Musleh, A. M. (2012). *Development of a framework for Total Quality Management principles in the construction companies with Special reference to the construction companies in the State of Qatar*. (A Doctoral thesis, Queen Mary, University of London). Retrieved from <https://qmro.qmul.ac.uk/xmlui/bitstream/handle/123456789/2321/AL-MUSLEHDevelopmentOf2011.pdf;sequence=1>
- Alotaibi, F. M., Yusoff, R. Z., & Islam, R. (2013). Analysis of Total Quality Management practices, competitiveness and their relationship to the task

- environment. *Australian journal of Basic and Applied Science*, 07(06), 515-526. Retrieved from <http://ajbasweb.com/old/ajbas/2013/April/515-526.pdf>
- Al Tamimi, A., Al Ansari, A., Kashwani, G., & Sajwani, A. (2017). Application of TQM and TSM in UAE construction safety management. *Industrial Engineering & Management*, 06(03), 1-6. doi: 10.4172/2169-0316.1000220
- Alvi, M. H. (2016, March). A Manual for selecting sampling techniques in research. Research in social science: *Munich personal RePEc archive*. Retrieved from <https://mpira.ub.uni-muenchen.de/70218/1/>
- Al-Zefeiti, S. M. B., & Mohamad, N. A. (2015). Methodological considerations in studying transformational leadership and its outcomes. *International journal of Engineering Business Management*, 07(10), 01-11. doi:10.5772/60429
- Amaniampong, E. A., Salakpi, A., & Bonye, F. (2014). Total Quality Management and its impact on the level of customer focus within construction project management in Ghana. *International journal of Business and Management Invention*, 3(7), 36-48. Retrieved from https://www.researchgate.net/publication/299469677_Total_Quality_Management_and_its_impact_on_the_level_of_Customer_Focus_within_Construction_Project_Management_in_Ghana
- Andrle, S. J. (1994). Total Quality Management in public transportation. *Transportation Research Board National Research Council*, 1(03), 1-39. Retrieved from http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rrd_03.pdf
- Anderson, E. W., Fornell, C., & Lehmann, D. R. (1994). Customer satisfaction, market share and profitability: findings from Sweden. *Journal of marketing*, 58(July 1994), 53-66. Retrieved from <https://www.jstor.org/stable/1252310?seq=1>
- Anderson, E. W., Fornell, C., & Mazvancheryl, S. K. (2004). Customer satisfaction and shareholder value. *Journal of Marketing*, 68(October 2004), 172-185. Retrieved from https://www.researchgate.net/publication/239490008_Customer_Satisfaction_and_Shareholder_Value

- Anthonisz, S., & Perry, C. (2015). Effective marketing of high-rise luxury condominiums in a middle-income country like Sri Lanka. *Journal of work-applied management*, 7(1), 61-83. doi:org/10.1108/JWAM-10-2015-002
- Arditi, D., & Gunaydin, H. M. (1997). Total Quality Management in the construction process. *International journal of Project Management*, 15(04), 235-243. Retrieved from <http://laaturakentaminen.fi/attachments/article/294/TQinConstruction.pdf>.
- Ariyawansa, R. G., & Perera, M. A. N. R. M. (2018). Socio-economic insight of the secondary housing market in Colombo suburbs: seller's point of views. *International scholarly and scientific research & innovation*, 12(10), 982-986. Retrieved from [https://www.researchgate.net/publication/328199610_Socio-Economic Insight of the Secondary Housing Market in Colombo Suburbs Seller's Point of Views](https://www.researchgate.net/publication/328199610_Socio-Economic_Insight_of_the_Secondary_Housing_Market_in_Colombo_Suburbs_Seller's_Point_of_Views)
- Ashokkumar, D. (2014). Study of Quality Management in construction industry. *International journal of innovative research in Science Engineering and Technology*, 03(01), 36-43. Retrieved from <http://www.laaturakentaminen.fi/attachments/article/294/StudyOfQuality.pdf>
- Ayegun, O. A., Falemu, J. O. A., & Olawumi, T. O. (2018). Assessment of clients' perception and satisfaction with project quality delivery in Nigeria. *Journal of sustainable Construction Engineering and Project Management*, 01(01), 27-44. Retrieved from https://www.researchgate.net/publication/324006238_Assessment_of_Clients'_Perception_and_Satisfaction_with_Project_Quality_Delivery_in_Nigeria
- Balasuriya, S. S., Bandara, K. M. K., Ekanayake, S. D., & Jayasinghe, M. T. R. (2007). The influence of transfer plated on the lateral behaviour of apartment buildings. *Journal of the Institution of Engineers, Sri Lanka December 2007*, XXXX(4), 22-30. doi: 10.4038/engineer.v40i4.7150.

- BASIC NEEDS. (1978, December). *Overseas Development Institute*. Retrieved from <https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/6616.pdf>
- Berg, A van den., & Struwg, M. (2017). Guidelines for researchers using an adapted consensual qualitative research approach in management research. *The electronic journal of Business Research Methods*, 15(02), 109-119. Retrieved from <http://www.ejbrm.com/issue/download.html?idArticle=463>
- Bergquist, B., Garvare, R., & Klefso, B. (n.d.). *The evolution of Quality Management*. Retrieved from <https://www.diva-portal.org/smash/get/diva2:1000184/FULLTEXT02.pdf>
- Bin Yang, J., & Chi Peng, S. (2006). Development of a customer satisfaction evaluation model for construction project management. *Building and Environment*, 43(2008), 458–468. doi:10.1016/j.buildenv.2006.07.044
- Bist, R. B. (2014). Research Procedure: An Introduction. *Journal of NELTA Surkhet*, 04(-), 34-40. Retrieved from <https://www.nepjol.info/index.php/JNS/article/view/12858/10423>
- Building the future: Sustainable condominiums in Sri Lanka. (2018/August). Daily FT. Retrieved from <http://www.ft.lk/propertyconstruction/Building-the-future-Sustainable-condominiums-in-Sri-Lanka/10516-661725>
- Burati, J. L., Matthews, M. F., & Kalidindi, S. N. (1991). Quality management in construction industry. *Journal of Construction Engineering and Management*, 117(02), 341-359. Retrieved from https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=
- Catalin, S. H., Bogdan, B., & Dimitrie, G. R. (2014). The existing barriers in implementation total quality management. *Course Hero*, 1234-1240. Retrieved from <https://www.coursehero.com/file/23043115/tqm2/>

- Chang, G. (2009). Total quality management in supply chain. *International business research*, 2(2), 82-85. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.659.3799&rep=rep1&type=pdf>
- Chen, S. H., Chen, F. Y., & Ping Wo, I. (2014). An Empirical study of TQM method practices for customer satisfaction and customer loyalty. *International Journal of Academic Research in Business and Social Sciences*, 4(5), 18-31. doi: 10.6007/IJARBS/v4-i5/820
- Chiguvi, D. (2016). Impact of Total Quality Management on customer satisfaction in the retail sector: Case of indigenous supermarkets in Botswana. *European Journal of Business and Management*, 08(28), 119-131. Retrieved from <https://iiste.org/Journals/index.php/EJBM/article/view/33385/34324>
- Creswell, J. W. (2014). *Research Design* (4th ed.). Retrieved from <https://scholar.google.com/citations?user=JxEeDoAAAAJ&hl=en&oi=sra>
- Dassanayake, H. C. (2014). An Investigation on Practicing Principles of Total Quality Management oin Apparel Industry in Sri Lanka: With Reference to ISO 9000 Quality Management Principles. *3rd International Conference on Management and Economics*, 293-302. Retrieved from <https://www.researchgate.net/publication/323069247>
- Dennis, R. (1998). Apartment housing in Canadian Cities, 1900 – 1940. *Urban History Review*, 26(02), 17-31. doi: 10.7202/1016656ar
- De Silva, N., & Ranasinghe, M. (2010). Maintainability risks of condominiums in Sri Lanka. *Journal of Financial Management of Property and Construction*, 15(1), 41-60. 1234-1240. doi: 10.1108/13664381011027971
- Dikmen, I., Birgonul, M. T., & Kiziltas, S. (2005). Strategic use of Quality Function Deployment (QFD) in the construction industry. *Building and Environment*, 40(2005), 245-255. doi:10.1016/j.buildenv.2004.07.001
- Erande, S. S., & Pimplikar, S. S. (2016). Total Quality Management in Indian construction industry. *International research journal of Engineering and*

Technology, 03(06), 685-691. Retrieved from https://scholar.google.com/scholar?hl=en&as_sdt=0%2C

Fanning, E. (2005). Practical assessment, research & evaluation. *A peer-reviewed Electronic Journal*, 10(12), 01-14. Retrieved from <https://scholarworks.umass.edu/pare/vol10/iss1/12/>

Femi, O. T. (2015). Barriers and benefits of Total Quality Management in the Nigerian construction industry: A review. *International Journal of Engineering Works*

2(01), 07-13. Retrieved from https://www.researchgate.net/publication/282655650_Barriers_and_Benefits_of_Total_Quality_Management_in_the_Nigerian_Construction_Industry_A_review?enrichId=rgreq-18c2965cb07c12c64dc19af5ba36b658-

Frooqui, R. U., & Ahmed, S. M. (2009). ISO 9000: A stepping stone to Total Quality Management for construction companies. *Seventh LACCEI Latin American and Caribbean Conference for Engineering and Technology*, (pp. 1-9). Retrieved from https://www.researchgate.net/publication/229043879_ISO_9000_A_Stepping_Stone_to_Total_Quality_Management_for_Construction_Companies

Fornell, C. (1992). A national customer satisfaction barometer: The Swedish experience. *Journal of Marketing*, 56(January 1992), 6-21. Retrieved from <https://journals.sagepub.com/doi/abs/10.1177/002224299205600103>

Frey, L. M., & Wilhite, K. (2005). Our five basic needs: Application for understanding the function of behaviour. *Intervention in School and Clinic*, 40(3), 156-160. Retrieved from https://www.researchgate.net/publication/249832861_Our_Five_Basic_Needs

Govender, P. (2013). The importance of customer needs and expectations in achieving Total Quality Management: A strategic view for future trends. *Corporate Ownership & Control*, 10(2), 708-713. Retrieved from https://virtusinterpress.org/IMG/pdf/10-22495_cocv10i2c4art5.pdf

- Gunduz, G. S., & Gunduz, C. (2017). Examining the perception of Quality and customer satisfaction within the framework of Total Quality Management in textile sector. *Tekstil ve Konfeksiyon*, 27(2), 101-107. Retrieved from <http://dergipark.gov.tr/download/article-file/318721>
- Gustafsson, A., Johnson, M. D., & Roos, I. (2005). The effects of customer satisfaction, relationship commitment dimensions, and triggers on customer retention. *Article in Journal of Marketing*, 69(October 2005), 210-218. doi: 10.1509/ jmk.2005.69.4.210
- Hailu, H., Mengstu, S., & Hailu, T. (2018). An integrated continuous improvement model of TPM, TPS and TQM for boosting profitability of manufacturing industries: An innovative model & guideline. *Management Science Letters*, 8(2018), 33-50. Retrieved from <https://www.researchgate.net/.../320908276> An integrated continuous improvement model of TPM T
- Halis, M., Twati, M. R., & Halis. (2017). Total Quality Management implementation in the healthcare industry: Findings from Libya. *Management Issues in Healthcare*, 3, 4-21. Retrieved from <http://aimijournal.com/Pages/DownloadHandler.ashx?DownloadObject=Article&Id=759239f0-b89b-47b7-a262-c52963026fb8>
- Halloweell, R. (1996). The relationships of customer satisfaction, customer loyalty, and profitability: an empirical study. *International Journal of Service Industry Management*, 7(4) 27-42. Retrieved from <https://doi.org/10.1108/09564239610129931>
- Hamed, T. (2016). Sampling methods in research methodology; How to choose a sampling techniques for research. *International journal of Academic Research in Management*, 5(2) 18-27. Retrieved from https://www.researchgate.net/publication/319998246_Sampling_Methods_in_Research_Methodology_How_to_Choose_a_Sampling_Technique_for_Research

- Harel, V., Gupta, A., Shitole, K., Nankar, A., & Shelake, A. (2016). Total Quality Management in residential project. *International journal of Engineering Science & Research Technology*, 5(4), 166-173. doi: 10.5281/zenodo.48853
- Harrington, H.J., Voehl, F., & Wiggin, H. (2012). Applying TQM to the construction industry. *The TQM Journal*, 24(4), 352-362. Retrieved from <https://notendur.hi.is/aho4/Lesk%C3%BAr%20hj%C3%A1%20Helga/seinni%20helmingur/Applying%20TQM%20to%20the%20construction%20industry.pdf>
- Hatkar, K. B., & Hedao, N. A. (2016). Delay Analysis by using relative importance index method in infrastructure projects. *International Journal of Civil Engineering & Concrete Structures*, 01(03), 09-20. Retrieved from <http://www.trpubonline.com/view.php?id=72>
- Hooper A., & Nicol, C. (1999). The design and planning of residential development: standard house types in the speculative housebuilding industry. *Environment and Planning B: Planning and Design* 1999, 26, 793-805. Retrieved from https://econpapers.repec.org/article/pioenvirb/v_3a26_3ay_3a1999_3ai_3a6_3ap_3a793-805.htm
- Housing Characteristics Hot Facts. (2018, April). *City of Richmond*. Retrieved from https://www.richmond.ca/__shared/assets/Housing6262.pdf.
- Housing Types and Characteristics. Retrieved from <https://www.trpc.org/DocumentCenter/View/774/Housing-Types-and-Characteristics-PDF?bidId=>
- Hsien Kuo, T., & Lin Kuo, Y. (2010). The effect of corporate culture and Total Quality Management on construction project performance in Taiwan. *Total Quality Management & Business Excellence*, 21(6), 617-632. doi: 10.1080/14783363.2010.483074
- Human Needs. (2006, September). *Then and Now*. Retrieved from https://www.nasa.gov/pdf/162514main_Human_Needs.pdf

- Huovila, P., & seren, K. J. (2010). Customer-oriented design methods for construction projects. *Journal of Engineering Design*, 9(3), 225-238. doi:10.1080/095448298261525
- Husin, H. N., Adnan, H., & Jusoff, K. (2008). Management of safety for Quality Construction. *Journal of Sustainable Development*, 01(03), 41-47. Retrieved from https://www.researchgate.net/publication/41892405_Management_of_Safety_for_Quality_Construction
- Idris, A. (2015). Improving student satisfaction through Total Quality Management. *National Higher Education Research Institute, Bulletin 5*. Retrieved from https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Improving+Student+Satisfaction+through+Total+Quality+Management+Aida+Idris+Academic+Development+Centre%2C+University+of+Malaya&btnG
- Ijaz, A., Kee, D. M. H., & Irfan, S. M. (2012). Internal customer job satisfaction and role of TQM practices. *Far East Journal of Psychology and Business*, 06(02), 1-14. Retrieved from https://www.researchgate.net/publication/227436463_Internal_customer_satisfaction_and_role_of_tqm_practices/link/00b7d52d170d0452b2000000/download
- Ilieska, K. (2013). Customer satisfaction index – as a base for Strategic marketing management, *TEM Journal*, 2(4), 327-331. Retrieved from <http://temjournal.com/documents/vol2no4/Customer%20Satisfaction%20Index%20%E2%80%93%20as%20a%20Base%20for%20Strategic%20Marketing%20Management.pdf>
- Imbeah, K. A. (2012). *Framework for the implementation of Total Quality Management (TQM) in real estate firms in Ghana*. (Master's thesis, Kwame Nkrumah University). Retrieved from <http://dspace.knust.edu.gh/bitstream/123456789/4675/1/KOBINA%20AFOAH%20IMBEAH.pdf>
- Jayalath, J. M. A. I. K. (2016). Determinations of market value for condominium properties: case Study in Dehiwala, Colombo. *13th International Conference on Business Management 2016*, (pp. 892-907). Retrieved from <http://journals.sjp.ac.lk/index.php/icbm/article/view/2987/2065>

- Jegan, G., & Kothai, P. S. (2017). A Study on Quality Management system and customer satisfaction in construction companies with a special reference to Coimbatore. *International Journal of Engineering Technology Science and Research*, 4(2), 54-63. Retrieved from <http://www.ijetsr.com/images/shortpdf/1486279311ifuna407ietsr.pdf>
- JHA, K. N., & IYER, K. C. (2006). Critical factors affecting quality performance in construction projects. *Total Quality Management*, 17(09), 55-47. Retrieved from https://www.researchgate.net/publication/41892405_Management_of_Safety_for_Quality_Construction
- Jung, J. Y., & Wong, Y. J. (2006). Relationship between Total Quality Management (TQM) and continuous improvement of international project management (CIIPM). *Technovation*, 26(2006), 716-722. Retrieved from <https://www.sciencedirect.com/science/article/pii/S0166497206000113>
- Kakkad, S., & Ahuja, P. (2014). Implementation of Total Quality Management in a construction firm. *International journal of Science, Engineering and Technology*, 3(10), 2653-2658. Retrieved from https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q
- Karna, S., Junnonen, J. M., & Kankainen, J. (2004). Customer satisfaction in construction. *Research Gate*, 1-12. Retrieved from https://www.researchgate.net/publication/242072243_customer_satisfaction_in_construction
- Karna, S., Sorvala, V. M., & Junnonen, J. M. (2009). Classifying and clustering construction projects by customer satisfaction. *Classifying and clustering projects*, 27(9/10), 387-398. doi: 10.1108/02632770910969621
- Karunasena, G., & Ranatunga, D.S. (2009). *Conference paper Customer satisfaction of residential condominiums in the Colombo city: Developers' perspective*. Department of Building Economics, University of Moratuwa.
- Khojeh, E., Mohseni, S., & Samadi, B. (2013). Enhancing customer satisfaction among SMEs through Web Technology. *Research notes in Information Science*, 11(1), 13-28. [doi:10.4156/rnis.vol11.2](https://doi.org/10.4156/rnis.vol11.2)

- Kiew, P. N., Ismil, S., & Yosof, A. M. (2016). Integration of Quality Management System in the Malaysian construction industry. *The Journal of Organizational Management Studies*, 2016(2016), 01-09. doi: 10.5171/2016.117211
- KOH, T. Y., & LOW, S. P. (2010). An empiricist framework for TQM implementation in construction companies. *Journal of Management in Engineering*, 26(3), 133-143. Retrieved from <http://hdl.handle.net/10722/173992>
- Kothari, C. R. (2004). Research Methodology (2nd ed.). Retrieved from <http://dl.saintgits.org/jspui/bitstream/123456789/1133/1/Research%20Methodology%20C%20R%20Kothari%20%28Eng%29%201.81%20MB.pdf>
- Kotze, P., Merwe, Alta van der., & Gerber A. (2015). Design Science Research Approach in Doctoral Studies. In *Twenty-first Americas Conference on Information Systems*, (pp. 1-14). Retrieved from <https://www.semanticscholar.org/paper/Design-Science-Research-as-esearch-Approach-in-Gerber-Kotz%C3%A9/62bf3c0cecb6b855b673837669a93c02c9e259>
- Kulu, H., & Vikat, A. (2007). *Fertility differences by housing type: The effect of housing conditions or of selective moves?* (Report No. 26, 775-802). Rostock, Germany: Max Planck Institute for Demographic Research.
- Kumar, R. (2011). Research Methodology (3rd ed.). Retrieved from http://www.sociology.kpi.ua/wp-content/uploads/2014/06/Ranjit_Kumar-Research_Methodology_A_Step-by-Step_G.pdf
- Kwan, Lai. Sai. (2016). Applying TQM principles in safety management a study on the effectiveness of Total Safety Management. *International Journal of Business and Social Science*, 07(11), 101-113. Retrieved from https://ijbssnet.com/journals/Vol_7_No_11_November_2016/10.pdf
- Lakhe, R. R., & Mohanty, R. P. (1994). Total Quality Management concepts, evolution and acceptability in developing economies. *International Journal of Quality & Reliability Management*, 11(9), 9-33. Retrieved from <https://www.academia>.

[edu/12244984/Total Quality Management Total Quality Management Concepts Evolution and Acceptability in Developing Economies](https://www.researchgate.net/publication/309014248_Study_of_Customer_Satisfaction_with_Living_Conditions_in_New_Apartment_Buildings)

- Lakshmi, R. (2015). Quality control and quality assurance in building construction. *In proceedings of National Conference Advances in Communication, Computation, Electrical Science and Structures*, (pp. 29-37). Retrieved from <https://pdfs.semanticscholar.org/6a37/4a98ee259f3c49e1f8ca854e092f2ac92527.pdf>
- Lepkova, N., Butkiene, E., & Belej, M. (2016). Study of customer satisfaction with living conditions in new apartment Buildings. *Real Estate Management and Valuation*, 24(03), 52-70. Retrieved from https://www.researchgate.net/publication/309014248_Study_of_Customer_Satisfaction_with_Living_Conditions_in_New_Apartment_Buildings
- Love, P. E. D., Li, H., Irani, Z., & Faniran, O. (2000). Total Quality Management and the learning organization: a dialogue for change in construction. *Construction Management and Economics*, 18, 321-331. doi: 10.1080/014461900370681
- Luburic, R. (2014). Total Quality Management as a paradigm of business success. *Journal of Central Banking Theory and Practice*, 3(1), 59-80. doi:10.2478/jcbtp-2014-0005
- Malik, M. Z., Banerjee, R., & Ahmad, S. A. (2018). A Review paper on implementation of Total Quality Management (TQM) in construction industry. *International Journal of Recent Scientific Research*, 9(05A), 26515-26517. doi: <http://dx.doi.org/10.24327/ijrsr.2018.0905.2074>
- Mary, F. J., & Surulivel, S. T. (2014). A study on buyer satisfaction in residential apartment with reference to VGN Infra Pvt. Ltd. *International Research Journal of Business and Management – IRJBM*, IV, 81-89. Retrieved from <http://irjbm.org/irjbm2013/April2014/Paper11.pdf>
- Mathers, N., Fox, N., & Hunn, A. (2009). Surveys and Questionnaires. *National Institute for Health Research*, 01-48. Retrieved from https://www.rds-yh.nihr.ac.uk/wpcontent/uploads/2013/05/12_Surveys_and_Questionnaires_Revision_2009.pdf

- Meenakshi, P. (2016). Customer satisfaction in construction industry. *International Journal for Research in Applied Science & Engineering Technology (IJRASET)*, 4(II), 161-166. Retrieved from <https://www.ijraset.com/files/serve.php?FID=3896>
- Mehmood, S., Qadeer, F., & Ahmad, A. (2014). Relationship between TQM Dimensions and Organizational Performance. *Pakistan Journal of Commerce and Social Sciences*, 8(3), 662-679. Retrieved from https://www.researchgate.net/profile/Faisal_Qadeer2/publication/300310813_
- Melnikovas, A. (2018). Towards an explicit research methodology: Adapting research onion model for futures studies. *Journal of Future Studies*, 23(02), 29-44.
doi: 10.6531/JFS.201812_23(2).0003
- Mensah, S. A. (2013). *Functionality and Adaptability of Design Solutions for Public Apartment Buildings in Ghana* (Doctoral Dissertation). Retrieved from <https://pure.tue.nl/ws/files/3972955/762203.pdf>.
- Mercy, O., & Taiye, T. B. (2015). Strategic imperatives of Total Quality Management and customer satisfaction in organizational sustainability. *International Journal of Academic Research in Business and Social Sciences April 2015*, 5(4), 1-22. doi: 10.6007/IJARBS/v5-i4/1549
- Metri, B. A. (2005). TQM critical success factors for construction firms. *India Management Development Institute*, 10(02), 61-72. Retrieved from https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q
- Mohajan, H. (2017, December). Research Methodology. *Munich Personal RePEc Archive*, 01-20. Retrieved from <https://mpa.ub.uni-muenchen.de/83457/>
- Mohammed, N. A. (2016). *The impact of Total Quality Management on the construction projects in the Sudan*. (Master's thesis, Sudan University of Science and Technology Collage of Graduate Studies). Retrieved from <http://repository.sustech.edu/bitstream/handle/123456789/14102/The%20Imp>

- Mohideen, O. M. M. H., & Vijayavel, J. (2014). Principles of Total Quality Management (TQM) Governing automotive industries with reference to skill enhancement and capacity addition. *International journal of Pharmaceutical Science and Business Management*, 2(9), 36-41. Retrieved from https://www.academia.edu/8434972/Principles_of_total_quality_management_tqm_governing_automotive_industries_with_reference_to_skill_enhancement_and_capacity_addition
- Mridha, M. (2015). Living in an apartment. *Journal of Environmental Psychology*, 50(272-4944(15)30002-5. doi:10.1016/j.jenvp.2015.05.002.
- Mugo, F. W. (n.d.), Sampling in research an apartment. Retrieved from http://www.indiana.edu/~educy520/sec5982/week_2/mugo02sampling.pdf
- Mustafa, E. M. A., & Bon, A. T. (2012). Role of top management leadership and commitment in total quality management in service organization in Malaysia: A review and conceptual framework. *Human Resource Management*, 51(2012), 11029-11033. Retrieved from https://www.researchgate.net/.../232703530_Role_of_top_management_leadership_and_commitment_int
- Mustafa, F. A., Hassan, A. S., & Baper, S. Y. (2010). Using space syntax analysis in detecting privacy: A comparative study of traditional and modern house layouts in Erbil City, Iraq. *Asian Social Science*, 6(8), 157-166. Retrieved from https://www.researchgate.net/publication/45266213_Using_space_syntax_analysis_in_detecting_privacy_a_comparative_study_of_traditional_and_modern_house_layouts_in_Erbil_city_Iraq.
- Murry, M., Pauw, C., & Holm, D. (2005). The house as a satisfier for human needs: A framework for analysis, impact measurement and design. *World congress on Housing Transforming Housing Environments through design September 27-30, 2005, Pretoria, South Africa*. Retrieved from <https://www.academia.edu>

/28782784/The house as a satisfier for human needs a framework for a
analysis impact measurement and design.

- Nagaprasad, H., & Yogesha, B. (2009). *Proceeding of the International Multi Conference of Engineers and Computer Scientists 2009 Vol II IMECS 2009, Hong Kong.*
- Nassar, M. L., Yahaya, K. A., & Shorun, C. Y. (2015). Total Quality Management and customer satisfaction in selected service industries in Ilorin, Nigeria. *Journal of Sustainable Development in Africa*, 17(06), 146-162. Retrieved from https://pdfs.semanticscholar.org/edea/d9c00a9fe9329af2f986404847b78a560212.pdf?_ga=2.44928100.1586942412.1587262933-607519895.1581314884
- Ndegwa, J. N. (2018). Determinants of apartment prices within housing estates of Nairobi Metropolitan Area. *International Journal of Economics and Finance*, 10(6), 104-111. doi:10.5539/ijef.v10n6p10.
- Neyestani, B., & Juanzon, J. B. P. (2016). Identification of a set of appropriate critical success factors (CSFS) for successful TQM implementation in construction, and other industries. *International Journal of Advance Research Engineering Science & Research Technology*, 4(11), 1581-1591.
doi:10.21474/IJAR01 /2248
- Nicoleta, I. (2010). Principles of TQM in automotive industry. *Romanian Economic and Business Review*, 5(4), 187-199. Retrieved from <https://ideas.repec.org/s/rau/journal.html>
- Ozdal, M. A., & Oyebamiji, B. F. (2018). Implementation of Total Quality Management and its effect on employees' performance in a Teaching Hospital in Oyo State, Nigeria. *Public health open access*, 2(3), 1-8.
doi: 10.23880/ phoa-16000129
- Pankaj, S., Naman, J., & Kunal, P. (2013). TQM: Implementation, scope and myths – A Review. *Research Journal of engineering sciences*, 2(6), 40-44. Retrieved

from <http://www.isca.in/IJES/Archive/v2/i6/7.ISCA-RJEngS-2013-069.pdf>

- Panuwatwanich, K., & Nguyen, T. T. (2017). Influence of Total Quality Management on performance of Vietnamese construction firms. *7th International Conference on Engineering, Project and Production management*, 182(2017), 548-555. Retrieved from <http://creativecommons.org/licenses/by-nc-nd/4.0/>
- Patil, M. M., & Kulkarni, S. D. (2017). Assessment of maturity level of Total Quality Management in construction industry. *International Journal of Latest Engineering and Management Research*, 2(2), 36-45. Retrieved from <http://www.ijlemr.com/papers/volume2-issue2/6-IJLEMR-22047.pdf>
- Perera, G. D. D. (2011). *Customer Satisfaction on Semi Luxury Apartments in Sri Lanka*. (Master's thesis, University of Moratuwa). Retrieved from <http://dl.lib.mrt.ac.lk/bitstream/handle/123/2010/96820.pdf?sequence=1>
- Pereira, M. A. C., & Da Silva, M. T. (2003). *Proceedings of the 31st Annual Conference of the Production and Operations Management Society*, POM-2003, April, 4-7,2003, Atlanta, GE.
- Pheng, L. S., & Teo, J. A. (2004). Implementing Total Quality Management in construction firms. *Journal of Management in Engineering*. 8-15. doi:10.1061/(ASCE)0742-597X(2004)20:1(8)
- Piyush, R., Bhatt, R., & Pitroda, J. (2016). Study of factors affecting customer satisfaction for residential flats in Surat and Ahmedabad city in Gujarat region of India. *International Research Journal of Engineering and Technology (IRJET)*. 3(3), 1-8. Retrieved from https://www.researchgate.net/publication/301220408_Study_of_Factors_Affecting_Customer_Satisfaction_for_Residential_Flats_in_Surat_and_Ahmedabad_city_in_Gujarat_Region_of_India
- Polat, P., Damci, A., & Tata, Y. (2011). Barriers and benefits of Total Quality Management in the construction industry: evidence from Turkish Contractors. *7th Research/Expert Conference with International Participations QUALITY 2011 Neum, B&H*. 1115-1120. Retrieved from <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.403.9392&rep=rep1&type=pdf>

- Populations, samples and sampling methods: Instructions and answers for teachers. (2015, September). *As and a Level Psychology: Teacher Instructions*. Retrieved from <https://www.ocr.org.uk/qualifications/as-and-a-level/psychology-h167-h567-from-2015/planning-and-teaching/>
- Prathapasinghe, D., Perera, M. P. R. I., & Ariyawansa, R. G. (2018). Evolution of condominium market in Sri Lanka: A review and predict. In *2nd International Conference on Real Estate Management and Valuation 2018*, (pp. 92-99) Retrieved from https://www.researchgate.net/publication/328137013_Evolution_of_CondominiumMarket_in_Sri_Lanka_A_Review_and_Predict
- Rafaai, Z. F. B. M., & Aziz, N. A. B. A., (2018). Value of customer feedback in quality management for construction quality improvement: Initial perspective review. *SSRG International Journal of Economics Management Studies*, 05(11), 1-5. Retrieved from https://www.researchgate.net/publication/331170705_Value_of_Customer_Feedback_in_Quality_Management_for_Construction_Quality_Improvement_Initial_Perspective_Review?enrichId=rgreq-ab7a1720c8d8d1345681ec4c764cc90d-
- Rajgor, M., Paresh, C., Dhruv, P., Chirag, P., & Dhrmesh, B. (2016). RII & IMPI: Effective techniques for finding delay in construction project. *International Research Journal of Engineering & Technology*, 03(01), 1173-1177. Retrieved from <https://www.irjet.net/archives/V3/i1/IRJET-V3I1203.pdf>
- Rajiv, S. R., & Harinath, S. (2018). Effectiveness of Total Quality Management in the process of construction. *International Journal of Applied Engineering Research ISSN 0973-4562*, 13(7), 85-88. Retrieved from https://www.ripublication.com/ijaerspl2018/ijaerv13n7spl_18.pdf
- Rasheed, A. K. F. (2016). Impact of Total Quality Management on customer satisfaction. *International Journal of Management and Commerce Innovations*, 4(2), 702-709. Retrieved from https://www.researchgate.net/publication/331558637_Impact_of_Total_Quality_Management_on_Customer_Satisfaction

- Rooshdi, R. R. R. M., Majid, M. Z. A., Sahamir, S. R., & Ismil, N. A. A. (2018). Relative importance index of sustainable design and construction activities criteria for Green Highway. *The Italian Association of Chemical Engineering*, 63, 151-156. doi:10.3303/CET1863026
- Rust, R. T., & Zahorik A. J. (1993). Customer satisfaction, customer retention, and market share. *Journal of Retailing*, 69(2), 193-215. Retrieved from <http://www.dina.com.cn/news/UploadFiles/t8.pdf>
- Sadik, R. M. (2018). Impact of Total Quality Management on customer satisfaction (E-Services). *International Journal of Advances in Computer Science & Technology*, 7(6), 31-35. Retrieved from <http://www.warse.org/IJACST/static/pdf/file/ijacst02762018.pdf>
- Saeed, N. M. N., & Hasan, A. S. (2012). The effect of Total Quality Management on construction project performance case study: construction firms in Yemen. *Journal of Science & Technology*, 17(2), 11-30. Retrieved from <https://ust.edu/ojs/index.php/JST/article/view/93>
- Salem, O., & Solomon, J., Genaidy, A., and Luegring, M. (2005). Site implementation and Assessment of lean construction techniques. *Lean Construction Journal* 2005, 2(2), 1-58. Retrieved from https://www.researchgate.net/publication/228676008_Site_implementation_and_assessment_of_lean_construction_techniques/link/550104fb0cf2aee14b58eba5/download
- Sakthivel, P. B., & Ahamed, M. F. N. (2013). A study to determine the home-buyer's preferences through voice of customer. *IOSR Journal of Engineering (IOSRJEN)*, 3(3), 26-32. Retrieved from [http://www.iosrjen.org/Papers/vol3_issue3%20\(part-3\)/E03332632.pdf](http://www.iosrjen.org/Papers/vol3_issue3%20(part-3)/E03332632.pdf)
- Salter, J. M. (1993). *Total Quality Management and Applications to the Construction Industry*. (Master's thesis, University of Florida). Retrieved from <https://apps.dtic.mil/dtic/tr/fulltext/u2/a268914.pdf>

- Sara, E. (2009). Module 3: Sampling methodology. *ILO school-to-work transition survey: Methodological Guide*, 1-33. Retrieved from https://www.ilo.org/wcmsp5/groups/public/@ed_emp/documents/instructionalmaterial/wcms_140859.pdf
- Saunders, M., Tosey, P. (2012/2013, Winter). The layers of research design. *Research-RAPPORT*, 58-59. Retrieved from https://www.academia.edu/4107831/The_Layers_of_Research_Design
- Senaratne, S., Zainudeen, N., & Weddikkara, C. (2006). Factors affecting condominium development in Sri Lanka. *Built-Environment-Sri Lanka*, 07(01), 23-28. Retrieved from https://www.researchgate.net/publication/265404796FactorsAffecting_Condominium_Development_In_Sri_Lanka
- Serpella, A. F., Ferrada, X., Harward, R., & Rubio, L. (2014). Risk management in construction projects: a knowledge-based approach. *Social and Behavioural Science*, 119(2014), 653-662. doi:10.1016/j.sbspro.2014.03.073
- Shah, M. P., Pitroda, J. R., & Bhavsar, J. J. (2014). Analysis of factors influencing productivity: survey of construction projects in Central Gujarat region of India. *International Journal of Engineering Science & Research Technology*, 03(04), 3082-3087. Retrieved from https://www.academia.edu/6994318/Analysis_of_Factors_Influencing_Productivity_Survey_of_Construction_Projects_in_Central_Gujarat_Region_of_India
- Sharon, R. K., & Okibo, B. W. (2012). Effects of Total Quality Management implementation on business performance in service institutions: A case of Kenya Wildlife Services. *International Journal of Research Studies in Management*, 1(1), 59-76. doi:10.5861/ijrsm.2012.v1i1.61
- Shebob, A., Shah, R., & Mhalas, A. (2013). A Review of Customer Satisfaction Factors in Libyan Housing Projects. *KICEM Journal of Construction Engineering and Project Management*, 26-34. Retrieved from https://www.researchgate.net/publication/264171453AReview_of_Customer_Satisfaction_Factors_in_Libyan_Housing_Projects

- Sheikholeslam, M. N., & Emamian, S. (2016). TQM and Customer satisfaction towards business excellence. *International Journal of Learning Management Systems*, 4(1), 35-42. doi:org/10.18576/ijlms/040105
- Sherif, K. F. (2010). *Total Quality Management and Construction Project Management in Libya*. Journal of Science & Technology (Doctoral dissertation). Retrieved from https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q
- Shinde, S .P., & Pimplikar, S. S. (2015). Application of Total Quality Management principles in material's suppliers evaluation. *International Journal of Advance Research in Computer Science and Management Studies*, 3(05), 219-226. Retrieved from https://scholar.google.com/scholar?hl=en&as_sdt=0,5&q=
- Shofoluwe, M., Boadu, A. O., Waller, L., & Bock-Hyeng, C. (2012). Quality improvement practices of award-winning residential builders and housing developers. *International Journal of Industrial Engineering & Production Research*, 23(1), 7-12. Retrieved from <http://IJIEPR.iust.ac.ir/.it..i/>
- Silva, M. S. L., & Fernando, W. T. L. (2016). Study on demographic background of potential buyers: With reference to Luxury condominium apartments in Colombo. In *13th International Conference on Business Management 2016*, (pp. 908-930). Retrieved from <http://journals.sjp.ac.lk/index.php/icbm/article/download/2988/2067>
- Singapore Standard Classification of Type of Dwelling. (2012, January). *Singapore Standard Classification of Type of Dwelling*. Retrieved from https://www.singstat.gov.sg/-/media/files/standards_and_classifications/sctd.pdf
- Sit, W. Y., Ooi, K. B., Lin, B., & Chong, A. Y. (2009). TQM and customer satisfaction in Malaysia's service sector. *Industrial Management & Data Systems*, (pp. 957-975). doi: 10.1108/02635570910982300

- Solanki, M., & Desai, D. A. (2017). *Proceedings of 2nd International Conference on emerging trends in mechanical engineering, February 24th – 25th, 2017 G H Patel College of Engineering & Technology, V V Nagar – 388120, Gujarat, India.*
- Somiah, M. K., Poku, G. O., & Aidoo, I. (2015). Relative importance analysis of factors influencing unauthorized siting of residential buildings in the Sekondi-Takoradi Metropolis of Ghana. *Journal of Building Construction and Planning Research*, 03, 117-126. doi:org/10.4236/jbcpr.2015.33012
- Suarez, J.G. (1992). Three experts on Quality Management. *Department of the Navy office of the under secretary of the Navy Total Quality Leadership office*, 92(02), 1-24. Retrieved from <https://apps.dtic.mil/dtic/tr/fulltext/u2/a256399.pdf>
- Sweis, G.J., Imam, R.M., Kassab, G.M., & Sweis, R. (2013). Customer satisfaction in apartment buildings: The case of Jordan. *Life Science Journal* 2013, 10(12s), 237-245. Retrieved from http://www.lifesciencesite.com/ljsj/life1012s/04212s_237_245.pdf
- Talib, F., Rahman,, Z., & Qureshi, M. N. (2010). The relationship between Total Quality Management and quality performance in the service industry: a theoretical model. *International journal business, management and social sciences*, 1(1), 113-128. Retrieved from https://www.researchgate.net/publication/266487967_The_relationship_between_total_quality_management_and_quality_performance_in_the_service_industry_A_theoretical_model
- Topalovic, S. (2015). The implementation of Total Quality Management in order to improve production performance and enhancing the level of customer satisfaction. *Procedia Technology*, 19(2015), 1016-1022. Retrieved from <https://reader.elsevier.com/reader/sd/pii/S2212017315001462?token=2682CBA2C20D5D258E44D9A9123AF9EA5DCA72026E877E9F9D694B181BB61433EDFB0D25515AFAD26078CB790C726D>

- Torbica, Z. M., & Stroh, R. C. (2001). Customer satisfaction in home building. *Journal of Construction Engineering and Management*, 10(12s), 237-245. Retrieved from <https://ascelibrary.org/doi/pdf/10.1061/%28ASCE%2907339364%282001%29127%3A1%2882%29>
- United States Government Accountability Office (GAO). 2013 Content Analysis Principles: and Practices. Retrieved from https://www.ignet.gov/sites/default/files/files/02_Content_Analysis_Principles_and_Practices.pdf
- Universal Declaration of Human Rights (UDHR). 2015 United Nations all rights reserved worldwide. Retrieved from <https://www.un.org/en/udhrbook/index.shtml>
- Waleed, Al-Azemi. (2012). *Total Quality Management within the construction industry of Kuwait*. (A Doctoral thesis, University of Loughbrough). Retrieved from https://repository.lboro.ac.uk/articles/Total_quality_management_within_the_construction_industry_of_Kuwait_the_role_of_Total_Quality_Management_and_its_usage/9455345/files/17078171.pdf
- Wanberg, J., Harper, C., Hallowell, M. R., & Rajendran, S. (2013). Relationship between construction safety and quality performance. *American Society of Civil Engineers*, 04013003, 1-9. doi:10.1061/(ASCE)CO.1943-7862.0000732.
- What are people's basic needs?. *Population Connection* © 2016. Retrieved from https://populationeducation.org/wp-content/uploads/2017/10/what_arepeoples_basic_needs.pdf
- Williams, C. (2007). Research Methods. *Journal of Business & Economic Research*, 05(03), 35-72. Retrieved from <https://clutejournals.com/index.php/JBER/article/download/2532/2578>
- Wong, A., & Fung, P. (1999). Total Quality Management in the construction industry in Hong Kong: A supply chain management perspective. *Total Quality*

Management, 10(02), 199-208. doi: 10.1080/0954412997956

- Yaacob, Z. (2014). The direct and indirect effects of customer focus on performance in public firms. *International Journal for Quality Research*, 08(02), 265-276. Retrieved from <http://www.ijqr.net/journal/v8-n2/10.pdf>
- Yale, H, O., Ododa, H., & James, C. (2018). The impact of Total Quality Management (TQM) policy on customer satisfaction at Kenya power and lighting company (KPLC) in Uasin Gishu, Kenya (2010-2012). *International Journal of Academic Research and Development*, 3(2), 187-193. Retrieved from https://www.academia.edu/38069530/3-2-67593_76_YALA_IMPACT_PDF_29_DECEMBER_2018.pdf. The impact of Total Quality Management Policy on customers satisfaction at Kenya Power and Lighting Company in Uasin_Gishu_County_Kenya
- Yousif, A. S. H., Najm, N. A., & Al-Ensour, J. A. (2017). Total Quality Management (TQM), organizational characteristics and competitive advantage. *Journal of Economic & Financial Studies*, 05(04), 12–23. Retrieved from <http://dx.doi.org/10.18533/jefs.v5i04.293>
- Zainudeen, N., Senaratna, S., Jayasena, S., & Rameezdeen, R. (2006). Horizontal housing property market. *Built-Environment-Sri Lanka*, 7(1), 16-22. Retrieved from https://www.academia.edu/3023973/Horizontal_housingproperty_market

APPENDIXES

Annexure A – Preliminary Interview Guideline

01st November, 2019

.....

.....

Dear Sir/Madam,

Conducting Preliminary Interview for Dissertation

I am Seevalee Bandara Ranatunga, a student of postgraduate course (MSc.) of Project Management under the Department of Building Economics, University of Moratuwa. I'm currently conducting a research under the final year Dissertation on the topic of **“ENHANCING CUSTOMER SATISFACTION IN SRI LANKAN SEMI LUXURY APARTMENT BUILDINGS USING OF TOTAL QUALITY MANAGEMENT”**.

In order to ensure the verify and conform the validity and adoptability of extracted factors through literature review which is related to the aforementioned topic, I wish to conduct preliminary interview with experts of apartment construction industry who are currently involving in and had experiences about the above topic. Therefore, I kindly request your assistance regarding, validating my research findings.

I strongly ensure that the information collected through this interview will be kept strictly confidential and should be used only for the purpose of the dissertation. And I will ensure that, any of your personnel information will not be disclosed to the public.

Thank you.

Yours faithfully,

.....

Seevalee Bandara Ranatunga

(077-6075700)

INTERVIEWEE INFORMATION

Name of the interviewee :

Name of the organization :

Designation :

Experience :

Date :

RESEARCH INFORMATION

A) Research Aim :

- Investigate how customer satisfaction could be enhanced in Sri Lankan semi luxury apartment buildings by using TQM concept.

B) Research Objectives :

- Review and study the concept of TQM & identify best practices of TQM.
- Study and investigate about the Sri Lankan apartment industry and its commercial classification.
- Identify the level of importance of TQM main factors which are affecting for customer satisfaction.
- Identify level of presently practicing performance of TQM main factors which are affecting for customer satisfaction.
- Develop a guideline to improve the customer satisfaction in Sri Lankan semi luxury apartment buildings by using TQM concept.

INTERVIEW QUESTION

Indicate your answer by highlighting and using “Yes” or “No” in your worksheet and relevant space provided along with the questions.

Question 01 :-

Are you agreed with following factors that would be affected to enhance the internal and external customer satisfaction in Sri Lankan semi luxury apartment buildings by using TQM concept?

I. Develop a process approach towards to TQM

☐

If No, what are the reasons?

.....
.....
.....
.....

II. Management commitment and leadership for TQM

☐

III. Develop Education and Training

☐

IV. Education to change the attitudes of staff

☐

V. Develop Team work

☐

VI. Customer service

☐

VII. Develop Managers competency

☐

VIII.	Development of Quality culture within the organization of apartment building construction	☐
IX.	Prepare project quality plans for all levels of work	☐
X.	Development of process management	☐
XI.	Develop Labour efficiency	☐
XII.	Rate of successful tenders or quality contractor selection	☐
XIII.	Development of Supply chain management	☐
XIV.	Development of Generate awareness	☐
XV.	Obtain the clients commitment for quality	☐
XVI.	Effectiveness of planning	☐
XVII.	Use the guidelines of construction industry specific factors	☐
XVIII.	Encourage the continuous improvement for all work activities	☐
XIX.	Partnering construction firms	☐
XX.	Developing of statistical methods for Information analysis	☐
		☐

- XXI. Employee empowerment and involvement for final product
- XXII. Develop the open communication system within the organization ☐
- XXIII. Develop Human resources management ☐
- XXIV. Develop Work safety ☐
- XXV. Develop RISK Management ☐

Question 02 :-

What are the most suitable sub factors that affected for further understanding of above main factors where mentioned under the question 01 as given bellow?

I. Develop a process approach towards to TQM

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II. Management commitment and leadership for TQM

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III. Develop Education and Training

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IV. Education to change the attitudes of staff

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V. Develop Team work

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VI. Customer service

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VII. Develop Managers competency

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VIII. Deevlopment of Quality culture within the organization of apartment building construction

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IX. Prepare project quality plans for all levels of work

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X. Development of process management

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XI. Develop Labour efficiency

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XII. Rate of successful tenders or quality contractor selection

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- XIII. Development of Supply chain management
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- XIV. Development of Generate awareness
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- XV. Obtain the clients commitment for quality
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- XVI. Effectiveness of planning
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- XVII. Use the guidelines of construction industry specific factors
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XVIII. Encourage the continuous improvement for all work activities

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XIX. Partnering construction firms

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XX. Developing of statistical methods for Information analysis

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XXI. Employee empowerment and involvement for final product

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XXII. Develop the open communication system within the organization

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XXIII. Develop Human resources management

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XXIV. Develop Work safety

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XXV. Develop RISK Management

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===== **End of Interview** =====

Annexure B – Questionnaire Survey Guideline

20/01/2020

Dear Sir/Madam,

Conducting Questionnaire survey for Dissertation

I am Seevalee Bandara Ranatunga, a student of postgraduate course (MSc.) of Project Management under the Department of Building Economics, University of Moratuwa. I'm currently conducting a research under the final year Dissertation on the topic of “**ENHANCING CUSTOMER SATISFACTION IN SRI LANKAN SEMI LUXURY APARTMENT BUILDINGS USING OF TOTAL QUALITY MANAGEMENT**”. In order to collect data for aforementioned topic, I wish to conduct questionnaire survey with the stake holders of apartment construction industry who are currently involving in and had experiences about the above topic. Therefore, I kindly request your assistance by filling questionnaire form which is attached bellow.

I strongly believe that you would support to my research by answering the questionnaire related to research topic. The information collected through this survey will be kept strictly confidential and should be used only for the purpose of the dissertation. And I will ensure that, any of your personnel information will not be disclosed to the public.

Thank you.

Yours faithfully,

Seevalee Bandara Ranatunga

(077-6075700)

QUESTIONNAIRE FORM	
SECTION A - RESPONDENT'S PROFILE	
ENHANCING CUSTOMER SATISFACTION IN SRI LANKAN SEMI LUXURY APARTMENT BUILDINGS USING OF TOTAL QUALITY MANAGEMENT	
Name	:
Designation	:
Organization	:
Date	:
Kindly indicate your answer by highlighting using “ + ” mark in your worksheet and relevant space provided along with the questions.	
1 Gender?	Male ☐ Female ☐
2 Age ?	Below 30 ☐ 31-40 ☐ 41-50 ☐ 51-65 ☐ Above 65 ☐
3 Experience in apartment building construction project?	< 6 years ☐ 6-10 years ☐ 10-20 years ☐ 20-30 years ☐ >30 years ☐
4 Your current role in the organization/construction project?	Director / Coordinator / Consultant ☐ General Manager / DGM/AGM ☐ Project Manager Site Manager / HR Manager ☐ Architect / Engineer / Quantity Surveyor ☐ Other ☐
5 How many Apartment projects that you have involved in the past?	1-2 ☐ 3-4 ☐ 5-6 ☐ 7-8 ☐ Over 9 ☐

SECTION B - Respondent's Comments for Critical Factors of				
ENHANCING CUSTOMER SATISFACTION IN SRI LANKAN SEMI LUXURY APARTMENT BUILDINGS USING OF TOTAL QUALITY MANAGEMENT				
Kindly indicate your answer by Marking relevent number in the box where provided along with the ranking factors.				
Main Factor - 01				
Develop a process approach towards to TQM				
Rating Scale A - Level of Importance for your organization				
Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5
Rating Scale B - Level of presently practicing performance in your organization				
Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5
Rating Factor			A	B
1.1 Conduct the TQM training and education for apartment construction employees				
1.2 Invest the time and money for above training and education programmes				
Main Factor - 02				
Management commitment and leadership for TQM				
Rating Scale A - Level of Importance for your organization				
Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5
Rating Scale B - Level of presently practicing performance in your organization				
Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5
Rating Factor			A	B
2.1 Management commitment and leadership for implementation of TQM in apartment construction				
2.2 Evaluate the benefits and advantages about TQM implementation in apartment building construction				

Main Factor - 03

Develop the Education and Training

Rating Scale A - Level of Importance for your organization

Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5

Rating Scale B - Level of presently practicing performance in your organization

Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5

Rating Factor

3.1 Conducting of technical and management training programs for apartment building construction employees

A**B****Main Factor - 04**

Develop the Team work

Rating Scale A - Level of Importance for your organization

Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5

Rating Scale B - Level of presently practicing performance in your organization

Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5

Rating Factor

4.1 Develop the inter divisional positive relationship with in the organization (Apartment building construction)

A**B**

Main Factor - 05				
Customer service				
Rating Scale A - Level of Importance for your organization				
Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5
Rating Scale B - Level of presently practicing performance in your organization				
Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5
Rating Factor			A	B
5.1 Priority to resolve matters related to the external customers, who are interested to buy apartments				
5.2 Provide first time right solutions for matters related to the internal customers (employees) of organization				
Main Factor - 06				
Development of Quality culture within the organization of apartment building construction				
Rating Scale A - Level of Importance for your organization				
Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5
Rating Scale B - Level of presently practicing performance in your organization				
Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5
Rating Factor			A	B
6.1 Allocate money for quality in annual budget of organization of apartment building construction				
6.2 Allow the sufficient time for quality				
6.3 Implement the " 5S " concept within the organization of apartment building construction				

Main Factor - 07				
Prepare project quality plans for all levels of work				
Rating Scale A - Level of Importance for your organization				
Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5
Rating Scale B - Level of presently practicing performance in your organization				
Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5
Rating Factor			A	B
7.1 Prepare project quality plans for all levels of activities related to the apartment building construction work				
7.2 Implement, practice and follow the quality plan in apartment building construction				
7.3 Review the feedbacks related to the quality plan of above activities				

Main Factor - 08				
Development of Process management				
Rating Scale A - Level of Importance for your organization				
Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5
Rating Scale B - Level of presently practicing performance in your organization				
Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5
Rating Factor			A	B
8.1 Every employees should aware about the organizational Vision and Mission of apartment building construction				
8.2 Every employees should aware about the organizational Goals and Objectives of apartment building construction				

Main Factor - 09				
Rate of successful tenders or quality contractor selection				
Rating Scale A - Level of Importance for your organization				
Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5
Rating Scale B - Level of presently practicing performance in your organization				
Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5
Rating Factor			A	B
9.1 Maintaining of sub-contractors data base in apartment building construction projects				
9.2 Implement the sub-contractor evaluation and selection criteria for apartment building construction projects				

Main Factor - 10				
Development of Supply chain management				
Rating Scale A - Level of Importance for your organization				
Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5
Rating Scale B - Level of presently practicing performance in your organization				
Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5
Rating Factor			A	B
10.1 Maintaining of material manufactures and suppliers data base for apartment building construction projects				
10.2 Update the manufactures and suppliers awareness about the material quality on above projects				
10.3 Monitoring of manufactures and suppliers continues positive improvements for quality on above projects				
10.4 Improve the manufactures and suppliers general practice about the work on time.				

Main Factor - 11

Development of Generate awareness

Rating Scale A - Level of Importance for your organization

Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5

Rating Scale B - Level of presently practicing performance in your organization

Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5

Rating Factor

11.1 Implementation of PLAN, DO, CHECK, ACTION practice in apartment building construction projects

A**B****Main Factor - 12**

Obtain the clients commitment for quality

Rating Scale A - Level of Importance for your organization

Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5

Rating Scale B - Level of presently practicing performance in your organization

Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5

Rating Factor

12.1 Obtain the client feedbacks on quality in apartment building construction

A**B**

Main Factor - 13				
Use the guidelines of construction industry specific factors				
Rating Scale A - Level of Importance for your organization				
Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5
Rating Scale B - Level of presently practicing performance in your organization				
Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5
Rating Factor			A	B
13.1 Practice to use quality codes, standards, drawings, conditions and specifications				

Main Factor - 14				
Encourage the continuous improvement for all work activities				
Rating Scale A - Level of Importance for your organization				
Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5
Rating Scale B - Level of presently practicing performance in your organization				
Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5
Rating Factor			A	B
14.1 Involvement to conduct research and development for work activities in apartment building construction				
14.2 Evaluate and implementation of new ideas and innovations in apartment building construction				

Main Factor - 15				
Developing of statistical methods for Information analysis				
Rating Scale A - Level of Importance for your organization				
Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5
Rating Scale B - Level of presently practicing performance in your organization				
Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5
Rating Factor			A	B
15.1 Maintaining of data record system for TIME, COST, QUALITY construction activities in apartment buildings				
15.2 Practicing of analyse the data and evaluate the result for above work activities				

Main Factor - 16				
Employee empowerment and involvement for final product				
Rating Scale A - Level of Importance for your organization				
Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5
Rating Scale B - Level of presently practicing performance in your organization				
Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5
Rating Factor			A	B
16.1 Every one should responsible for final end product of apartment building as planed				
16.2 Encourage the employees towards to create innovation and value engineering ideas for apartment building work				

Main Factor - 17				
Develop the open communication system with in the organization				
Rating Scale A - Level of Importance for your organization				
Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5
Rating Scale B - Level of presently practicing performance in your organization				
Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5
Rating Factor			A	B
17.1 Develop the information transmission system from top to bottom & bottom to top within the organization				

Main Factor - 18				
Develop the Human resources management				
Rating Scale A - Level of Importance for your organization				
Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5
Rating Scale B - Level of presently practicing performance in your organization				
Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5
Rating Factor			A	B
18.1 Encourage the employees for further higher education and carrier developments activities				
18.2 Develop and execute employee evaluation system for promotions and increments in apartment building construction sector				

Main Factor - 19

Develop the Work safety

Rating Scale A - Level of Importance for your organization

Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5

Rating Scale B - Level of presently practicing performance in your organization

Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5

Rating Factor

	A	B
19.1 Study and prepare a appropriate SAFETY plan for Apartment building construction projects		
19.2 Identify and nominate the emergency assembling locations in Apartment building projects		
19.3 Allocating of sufficient budget for Work Safety in Apartment building construction projects		
19.4 Encourage the employees to use of Personal Protective Equipments in Apartment building construction projects		
19.5 Maintaining of accident report register in Apartment building construction projects		

Main Factor - 20				
Develop the RISK Management				
Rating Scale A - Level of Importance for your organization				
Not important	Little important	Somewhat important	Important	Very important
1	2	3	4	5
Rating Scale B - Level of presently practicing performance in your organization				
Not practicing	Aware only	Slightly Practicing	Practicing	Strongly practicing
1	2	3	4	5
Rating Factor			A	B
20.1 Encourage employees to maintain RISK register related to the apartment building construction				
20.2 Develop the appropriate RISK measuring system related to the apartment building construction				
20.3 Study and select suitable RISK evaluation for above				
20.4 Study, investigate and identify the suitable system for respond to RISK				