

**ESSENTIAL SKILLS AND COMPETENCIES OF
QUANTITY SURVEYORS FOR PROPERTY
DEVELOPMENT SECTOR IN SRI LANKA**

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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.

Further, I acknowledge the intellectual contribution of my research supervisor Ch.QS Prof.(Mrs) B.A.K.S. Perera for the successful completion of this research dissertation. I affirm that I will not make any publication from this research without the names of my research supervisors as contributing authors unless otherwise, I have obtained written consent from my research supervisors.

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Date

ABSTRACT

The property development sector is an indicator of the economy and it is now becoming one of the most dynamic fields. Consequently the property development sector has offered wide venture open doors for the financial specialists while giving appealing business chances to the experts. Quantity surveyors are one of the most significant experts in the property development area and Quantity Surveyors need to assume a crucial job. Subsequently, the investigation expects to recognize the skills and competencies required by Quantity Surveyors to give a compelling and effective support of the property development in Sri Lanka. To accomplish the goals of this exploration, information were gathered utilizing a literature review, expert questionnaire survey, and a questionnaire survey. Manual content analysis was used to analyze the findings of questionnaire survey. Data analysis of a questionnaire survey was conducted through descriptive statistics includes frequency, mean and Likert scale including relative importance index by taking advantage of SPSS (Statistical Package of Social Science).

Thirty-six (36) skills and forty-five (45) competencies were distinguished as basic to perform Quantity Surveyor's job. Plus, the examination has concentrated on the Four (4) stages of property development and there fifteen (15) stages where the involvement of Quantity Surveyor's is essential. The consequences of the current investigation demonstrated that significant stages of the property development where essential of QS is basic and commitment of every one of the skills and competencies required by Quantity Surveyor to act in various stages of property development sector positioning by utilizing Relative Important Index (RII). Consequences of the study have been demonstrated that the inclusion of Quantity Surveyors is generally basic inside a wide range of property development stages for the achievement of their undertakings. It additionally shows all the skills of Quantity Surveyors are and numerous competencies of Quantity Surveyors are generally basic in the property development. Furthermore, Quantity Surveyor has been distinguished as a basic and appropriate proficient to property development organizations.

Keywords: Quantity Surveyor, Property development, Stages, Skills, Competencies

*I dedicate this dissertation to my beloved
parents for nursing me with affection and love
and their dedicated partnership for the success
of my life.*

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ABBREVIATIONS

AIQS	-	Australian Institute of Quantity Surveyors
BIM	-	Building Information Modeling
BOQ	-	Bill of Quantities
COC	-	Certificate Of Conformity
FIDIC	-	Federation Internationale Des Ingenieurs Conseils
IQSSL	-	Institute of Quantity Surveyors in Sri Lanka
LCCA	-	Life Cycle Cost Analysis
PAQS	-	Pacific Association of Quantity Surveyors
PM	-	Project Management
QS	-	Quantity Surveyor
QSs	-	Quantity Surveyors'
RII	-	Relative Important Index
RICS	-	Royal Institution of Chartered Surveyors
SPSS	-	Statistical Package of Social Science
VM	-	Value Management

1.1 Background

"Property development" is that the method by that buildings are raised for use/employment or sale/funding and it is a main element of each urban limit and urban quality. To inspire development and guarantee maintainability, urban areas require ventures fit for making and renovating locales and dealing against background of dynamic and flighty amendment in the interest for areas and building structures (Healy, 1998 cited by Ebohon et al., 2011, p11). "Property development is associate trade that produces buildings, for employment with the integration of varied raw materials where land is just one factor and others are Capital, Labor, and Material" (Cartlidge,2012, p91). Gangoellis et al., (2008) stated that Property development undertakes a basic job in the nation's economy and is encountering an impressive development right now. In any part of the world, the property development sectors gain a large part of their Gross Domestic Product (Zainudeen, Palliyagaru, and Nirooja, 2006).

According to the Central Bank of Sri Lanka in 2018, the percentage share of gross Domestic Product by property developments industry is 26.1% and it shows the second highest market in the country. This depicts the significance of property development (Kim and Mauborgne, 2008). Dayarathna (1996) explains, "Property development sector in Sri Lanka is now rising from its dampened state, and is highly growing" and the demand for the residential and business buildings comes in the first place. In the advanced development industry, the Quantity Surveyor plays an emergent job as of the fast changing and expanding nature of the industry (Dayarathna, 1996). Shafiei& Said, (2008) expressed that a Quantity Surveyor who expected a significant job in the construction development comprised various and comprehensive obligations to accomplish cost-adequacy in development projects. "Quantity surveying profession is continuously threatened with challenges and opportunities in new markets" (Dada & Jagboro, 2012, p.79). Cartlidge (2012)

additionally found that the Quantity Surveying profession is going through an altering period and to challenge more popularity for its benefits in the development showcase in numerous nations.

In the RICS report (1991) on “The Chartered Surveyor as Management Consultant” has declared that; “Construction property-related management advice or property resource management consultancy is a recently rising market which the surveying profession should address if it needs to keep up its position as leading advisors to the development & property industry”. Hence Quantity Surveyors also have a good demand and wider opportunities within the property development sector. Nowadays Quantity Surveyors are also turning to new directions of their job and they are developing their careers to suit the recently emerged job opportunities.

1.2 Problem statement

The improvement in the construction industry is progressively in size, technical complexity, interdependencies, and variations in demand from the investor (Olatunji, 2007). The extent of the development is spread in a wide range including private, business, facility building construction, heavy engineering constructions and infrastructure works (Abidin, Adros & Hassan, 2014; Ofori 2012). Property development is an energizing and periodically frustrating, progressively complex activity including the use of rare resources (Crown and Smith, 2004). Chong, Lee & Lim, (2012) described it is a high-risk activity that often involves large sums of money tied up in the production process, providing a product that is relatively indivisible and illiquid. Furthermore, Kim and Mauborgne (2008) stated the performance of an economy at national and local levels, both directly influences the process.

According to Horta et al. (2012), due to the advancement of the construction industry, the construction process and its technology have rapidly changed. A Quantity Surveyor in the construction industry, who usually directs cost and quality control everywhere throughout the lifecycle of a building project, is fundamental to constantly redesign QS skills, especially if he/she works in property development (Olatunji, 2007). A Quantity Surveyor in this specialty has to pay precaution not

only to the project's development but also to the nature and future viewpoints of the construction industry to increase the developer's overall financial performance. Study on Quantity Surveying skills and competencies for the property development sector has been very least in the local as well as in the world wide setting. Consequently, there is a gap on studies to discriminate significant skills and competencies essential for Qs performing property improvement in Sri Lanka Hence this exploration was done on Essential Skills and Competencies of Quantity Surveyors for property development sector in Sri Lanka.

1.3 Aim of the research

The aim of this research is to evaluate the skills and competencies significantly required by Quantity Surveyors to provide a sound service to the "develop and sell" type property developments in Sri Lanka.

1.4 Objectives

- 1) Identify the skills and competencies of Quantity Surveyors
- 2) Identify the types of property developments which require Quantity Surveying services.
- 3) Identify the significance of the QS involvement at different stages of property development
- 4) Analyze the most significant skills and competencies of Quantity Surveyors at each stage of property development.
- 5) Analyze the most significant skills and competencies of Quantity Surveyors in property development.

1.5 Methodology

- Literature Review

To identify the background and current state of the study, a in detail literature survey was conducted to recognize the study gap and theoretical condition on property development and involvement of quantity surveyors skills and competencies by referencing using journals, books, articles, conference, reports to collect information for achieve objectives.

- Expert Interviews

Specialist interviews were directed with quantity surveying specialists/experts in the construction field who involved with the property development in construction practices to identify the awareness of literature findings and collect more information to recognize extra skills and competencies of quantity surveyor that would essential for property development sector.

- Questionnaire survey

The questionnaire survey was prepared attaching the Quantity Surveying skills and competencies recognized the literature survey. Questionnaire survey was conducted using questions to gain technical responses concerning the skills and competencies. Moreover, it was utilized to make strengthen the finding of a literature survey and expert interview.

1.6 Scope and limitations

- The study is of the research is limited to the “Develop and sell” type property developments, especially in “new building construction”.
- The selected area of the study is bounded to the property developers with in the Colombo city limits.
- This research is focused on identifying the significant skills and competencies of Quantity Surveyors in property development based on Sri Lankan context.

1.7 Structure of the dissertation

This dissertation was organized into five chapters to be specific as an presentation, writing combination, strategy for study, examination and discoveries and ends and suggestions.

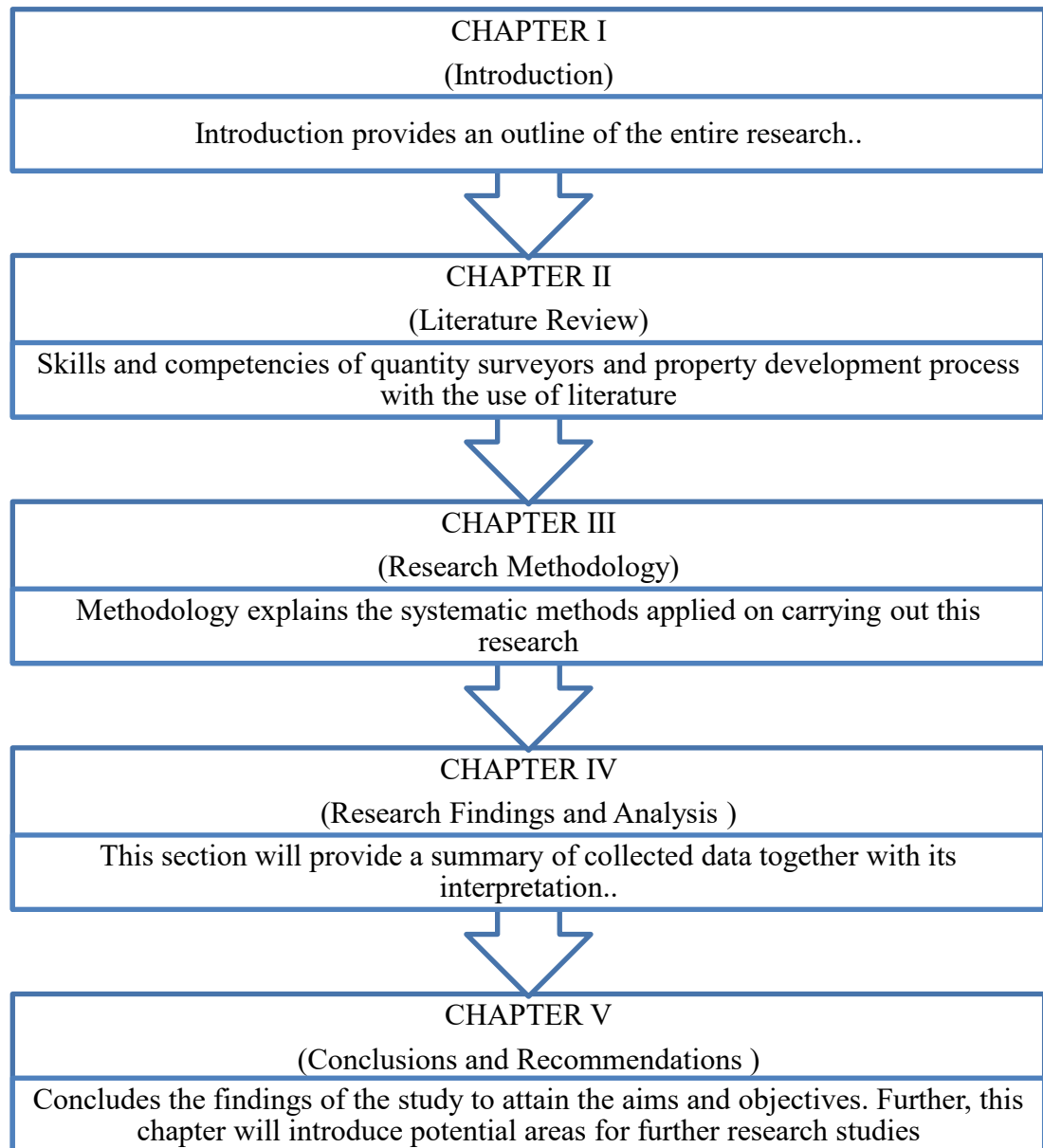


Figure 1.1: Chapter breakdown

Chapter 01:- Introduction

Chapter one introduces the subject matter to the reader. It sets the background for the project such that the reader can understand the importance of the studying skills and competencies essential for quantity surveyor in different stages of the property development sector.

Chapter 02:- Literature review

This chapter explains a critical review of the skills and competencies of quantity surveyors and property development process with the use of literature and figures out most skills and competencies of quantity surveyors related to the property development process.

Chapter 03:- Method of study

The third chapter provides a scientific methodology used to achieve study aim and objectives. In addition the chapter described the various methods of data collection in orderly manner and the how data going to analysis in aspect of the study requirement.

Chapter 04:- Analysis and finding

Chapter four provides results and findings after evaluate data collected from chapter 3. The results on a preliminary survey, Relative importance index (RII), and comprehensive analysis presented in this chapter.

Chapter 05:- Conclusions and recommendations

The final part concludes the results filtered from the findings in detail literature this chapter discusses the data obtained from the findings in the literature review and compares it with findings. Here noted conclusions and all the research have been conducted to satisfy the aim and objectives of this study.

2.1 Introduction

This chapter explains the property development sector, to identify how the Quantity Surveyor can effectively use their skills and competencies in the context of property development. The background of the study described in the very first chapter and this part will explain the in detail knowledge of the study with a contended summarization. Firstly, the background of Quantity Surveyor, what is quantity surveying, skills, and competencies of Quantity Surveyors in property development. Secondly, it describes the property development, identifies the types of property development that essential for Quantity Surveyors, identifies the stages of where the participation of Quantity Surveyors. Moreover, it illustrates the skills and competencies of Quantity Surveyors at each stage of property development. Furthermore, this literature chapter illustrated the need for quantity surveying skills and competencies in property development.

Finally, the literature survey has wound up by reaching the research topic, "Quantity Surveyors skills and competencies essential for property development sector" which would support identifying prevailing skills and competencies of Quantity Surveyors, analyze the allocation of all skills and competencies factors among property development stages and process.

2.2 Quantity Surveying Profession

2.2.1 Historical overview of the profession

Quantity Surveyor (QS), a famous profession adds worth principally to the budgeting and contract management of construction sector at the briefing, design, tendering, construction and commissioning stages (Abidin , Adros & Hassan,2014). Qs contribute to overall construction project act by acquiring, developing and deploying appropriate competencies (Nikado and Meyer, 2001).

The starting points of QSs can be followed back to the antiquated Egyptian human advancement who utilized committed work force to do gauges and costing for their grand structures and structures (Shafiei & Stated, 2008). QS Position advanced into professional level during the 17th century renovation of London after the Great Fire (Said, Shafiel and Omran, 2010). Further Ajanlekoko (2012) stated that the QS were occurred in a profession in the United Kingdom (UK) in the mid-nineteenth century. Since then, it has turned in to one of the most demanding as well as critical professions in the construction industry (Olanrewaju and Anahve, 2015).

2.2.2 Different aspects of QS profession

QS has been defined considering dissimilar aspects of the profession. However, financial management phase has been the core of QS and still it is the expectation of employing a quantity surveyor (Fanous & Mullins, 2012). The QS, being the expert in construction cost modeling, can play a key role in improving budget outcomes and the financial management phase has been the root of QS and still it is the expectation of employing QS (Perera, Pearson and Dodds, 2014). QS Involves cost management, procurement, and contractual matters in the supply chain and market for construction (Fanous & Mullins, 2012). They display and update early estimates and contractual requirements as the construction progress based on supplementary works and variations (Ashworth, Hogg, and Higgs, 2013). QS is a professionally trained person in dealing with the key problem areas like construction cost, construction management, and construction communication in a construction project on behalf of the employer and involved in various types of construction including civil, building, removal, petrochemical plants and factories construction and fixings (Potts, 2008). QS is essentially a cost skillful whose prime task is to ensure that the project is kept within the agreed budget and that the employer attains value for money (Lowry, 2009).

According to Yogeshwaran et al (2014), “QSs are construction economists who fulfil varied and comprehensive duties to support cost-effective construction and property development projects”. Furthermore, Hawkins (2013) has defined the QS as the cost and financial accountant in the construction industry. According to Lee, Perera & Hogg (2013), Quantity surveying is concerned with the cost and financial

management of construction projects. Its expertise enhances the design process through the reasonable use of cost limitations to sustain viable links relating price, utility, and forms which contributions in attaining the employer's objectives within the predetermined budget (Kelly, Male & Grahan, 2004). These descriptions restrain the part of QS to financial aspects of the development which is not the case in the present construction industry. Yogeshwaran et al (2018) explained QS is a professional in the construction industry who can analyze both cost components and practical physical construction works of a project fruitfully to be able to apply the results of his analysis in solving problems peculiar to each project. The responsibility of the QS comprises cost calculation, assessment of economic and contractual preparation of the project which is often meaningfully prejudiced by factors in the environment, and changes that are exclusive to the individual project (Senaratne & Sabesan, 2008). Knowledge over the years supported the significant development in performs and actions of quantity surveying since formation (Murphy, 2011), many decades ago. RICS report published in 1971 (as cited in Rameezdeen, 2006) defined QS as "specialists in measurement and valuation of construction work". However, with the evolution of the roles of QS, these definitions do not give an exhaustive idea as to what QS is. Seeley(1997) besides defined QS as one of many specialists involved in the construction development and has exact duty for project cost control not only over the construction stage but for the whole life of the building. Though this considers one of the emerging duties of QS, which is whole life costing, there are heaps of other evolving duties that are not addressed within this definition Yogeshwaran et al., (2014).

The QSs, in the current construction industry, over and done with skills and ability, analyze cost mechanisms of a construction project methodically and apply the results of the study to a diversity of financial and financial problems confronting the developer and the designer (Ilias and Mohd, 2010). Badu and Amoah (2004) state that the changing roles of the QSs had been redefined by the quality of education received. Lenard (2000) argued that the changing nature of the construction and growth industry as regards the acceptance of innovative technological procedures and development, the emergence of highly focused professionals and the full range

of advanced technologies require a much stronger emphasis on job competencies than ever before. However, competence, in any scope of work, can be a hard perception to pin down particularly when it relates to professional professions where such roles can be complex, and the knowledge and skills involves many and varied professionals (Cartlidge, 2012). According to Ilias and Mohd (2010) Qs are construction economists who fulfill various comprehensive duties to support cost-effective construction and property development projects.

2.3 Quantity surveying profession is imperative in the construction industry

According to Willis's Practice and Process for the QS (Ashworth, Hogg & Higgs, 2007, p.1), the role of the quantity surveying has been defined by Royal Institution of Chartered Surveyors (RICS, 2014) as "ensuring that the resources of the construction industry are utilized to the best advantage of society by providing, inter alia, the financial management for projects and a cost consultancy service to the client and designer during the whole construction process." But this role of the QS has different over the years and the current QS perform his competencies in expanded paths within the construction trade as well as outside the limitations of the construction industry (Brandon, 1994). Although it is supposed that the ancient Egyptians have used a system of Quantity Surveying (AIQS, 2012), the profession of Quantity Surveying has appeared in the late 18th century with the industrial revolution, which witnessed large-scale urban growth, industrial development, and infrastructure development (Addai, Nkuah and Amoah, 2009).

2.4 Role of the quantity surveyor

QS is a highly resourceful specialist who uses his skills to handle multiple tasks relevant to a field of engineering throughout the project start to finish (AIQS, 2012). According to the RICS (2014), AIQS (2012) recognized professional bodies, it is observed that the QS will play an important role in the construction industry for the most part as below. (RICS, Technical Competence Assessment, 2014). RICS report published in 1992 discussing the role of the QS profession (Perera et al., 2011), Brandon's book (1994) outlining future changes in the position of Qs, Smith's (2009) publication on 'QS trends', and Fanous and Mullins (2012) publication

explaining the current and developing roles of QSs provide clear evidence of the changing roles of QSs. QSs, however, have to play both conventional and contemporary positions in the modern construction industry. There many ways to look at the position of QSs. As discussed in the introduction, it can be classified as the QS of Consultant, Contractor, and Client, both falling under traditional roles. Today, QS has been merged with other sectors such as insurance, banking, manufacturing, taxes, valuation (Hemajith et al., 2007), petrochemical, mining, aeronautical, shipping and transportation industries (Smith, 2004), which are the profession's newcomers, recognized as modern positions. QSs are engaged in building projects from start to finish. His functions and responsibilities have changed significantly with the maturation of the QS profession.

2.4.1 Traditional role

The conventional part of the QS is mainly based on the practices related to the measurement and valuation (Badu & Amoah, 2004). This conventional role of the QS again can be classified as Consultant - Contractor and Pre-contract - Post-contract likewise (Rameezdeen, 2006). The Contractor's QS main task is to prepare value of completion work and maintain comprehensive records during cost planning and controlling in construction sector (Shafie & Said, 2008). Consultant's QS role is advising the client on budget aspects and cost feasibility, cost limit, Bills of Quantities (BOQ) preparation, prepare tender documents, pre analysis and evaluating tenders, negotiation, prepare bid reports, making recommendation on payments and advising on financial aspects of extra work and claims (Shafie & Said, 2008).

Cost Planning

Cost planning is a professional task of the QS and it is needed to help all the members of the design team to achieve practical and efficient designs for the project and to be within the client's budget (Senarathna and Sabesan, 2008). Effective cost control should help ensure that, once a fair estimate is accepted, everything that happens from the effective contractor's tender to the ending project cost is in line with it. Cost-management results are better economic efficiency and better

performance of money. Constant monitoring ensures early and timely correction of the risk of excessive expenditure.

Document preparation, especially bills of quantities

Several documents regard to a contract is supposed to be prepared by practicing QS. Out of them the main document wanted for a bond are the BOQ and it is which has been prepared jobwise and to the standards, will be a valued tool in cost control and management aspects. Preparation of a tender document is also a major task of QS and due to that, he has to do many other documents works with BOQ, Conditions of contract, and Preambles to schedules of prices, etc (Champika, Perera, & Rodrigo, 2018)

Final account preparation and agreement

It is an important task of a contractor QS to prepare the final account of a project and to be receiving agreed with the consultant. In the process of preparation of final accounts there he should be smart enough to incorporate all the day works; variation in the bills if not included in interim bills (Ashworth, Hogg, and Higgs, 2013).

2.4.2 Contemporary/ Evolving Roles

The deviations occurred in the countries due to the fluctuations in financial and political arena, majority of schemes functioned rely on their need altered. Development in related to the constructing buildings, infrastructure that is mainly depend on country political situation and financial situation. Thus the face of the construction sector has changed with these factors (Bertelsen and Sacks,2007; Bertelsen and Sacks ,2007; Baccarini, 2004; Fellows, Liu, & Fong, 2003; Potts, 2004).

Project Management

To order to keep the project cycle within costs, time and quality limits, a project manager is needed primarily although QS generally provided project management without recognition or recognition as part of their expanded traditional role to them in successfully carrying out project management tasks (Kerzner, 2011). For effective

project management, a project director is expected to have a sound understanding of technological and decision-making proficiency (Murphy, 2013). In the context of Sri Lanka, the growth of QSs skills and expertise related to project scheduling, assessing, managing, predicting, assessing, etc, will enhance their job role to strengthen and expand conceptual area can be defined as Project Management, in the manner of construction (Rahim et al., 2013).

Risk analysis

The building sector is exposed to superior danger and environmental fluctuations, Risk analysis support to saving a large sum when consider the unforeseen events in the industry, hence well planned control system require to quantify the possibility of risks with surveying basis to avoid, reduce or eradicate (Fan, Lin & Sheu, 2008). Since the construction industry is exposed to higher danger and fluctuations and requires large amounts of expenditure, a formalized monitoring system is needed to measure risks reliably and measurably to reduce or eliminate their potential impact (Perera et al., 2012). Since QSs have deep construction experience and are exposed to project economics, they will expertise the required field (Brandon, 1994).

Value management

“VM can be defined as concept of evaluate the functional value of project or item by using several scientific technics and expert knowledge’s, this can be apply to project from beginning to the completion” (Kelly & Male, 1993 cited (Olanrewaju and Anahve, 2015). The QSs essential skills to comprehend & control information in a rational method & potential to communicate relevant information’s precisely and simply the Quantity Surveyors appropriate for the do the role as value manager Ganidu et al (2012).

Whole life costing

It is normally assumed by owners as part of the strategic reconsideration of their facilities. It influences the procurement of new buildings & engineering structures & the choices about the renewal, refurbishment & disposal, etc. (Glucha and Baumann, 2003).

Development Appraisal

The planning evaluation involves economically feasibility and technically viable evaluation of plans and possible allocation of resources and recommendations on reimbursement of capital investment preparing the clients budget & next issues associated to the clients' valuation of an initial project. Understanding the connection between these variables is a significant part of the procedure of progress and involves a detailed capacity of the property sector, the term normally stems from the standard survey of quantities (Olantunde, 2006).

Guidance on contractual arguments / Disputes Resolution

The building sector is common for higher level of conflicts. The techniques for dispute solving suit more and more relevant Chong, Lee and Lim, (2012). Arbitration is the greatest required after method in the construction trade among the different level of dispute solving technics Chandrasiri (2010). An arbitrator should be practically aware with the type of contract, the technicalities of the issues at issue and the good knowledge of the arbitration procedure and should be fair to all parties (Zainudeen et.al, 2006, p.55).

Technical Auditing

Employers often need professional analysis of construction costs to make sure they are asking for a fair and reasonable price for the work performed. The tender may have been submitted based on sketches and requirements and in the course of the work the same variations have occurred rather, the bond may be based on prime cost plus a percentage, and the customer wants to be sure that the costs have been properly calculated Olatunde (2006)

Valuation for Insurance Purposes

Damage can occur in a construction project for many reasons, such as fire, natural ruins, sabotage, etc. In such cases, both insurers and property proprietors require professional leadership on damage assessment. In addition to merely valuing QSs, it is important to provide several other insurance services within the valuation

framework. They are loss adjustment and risk assessment, advice and bond and security investigation Olanipekun et al., (2013)

2.5 Demand for the profession of Quantity Surveying

Sri Lankan quantity surveyors have high demand for their services internationally. Recently, economic development in the country has initiated heaps of new construction projects, which has bestowed to the demand of QS profession within the country (Fanous and Mullins, 2012). With that, re-construction of buildings and infrastructure facilities damaged by war in Northern and Eastern provinces has brought forth significant opportunities for quantity surveyors (Chandrasiri, 2010). Though the professional services of Sri Lankan quantity surveyors are highly demanded worldwide, they face many challenges in number of ways. Nowadays, personnel from other disciplines are involving in QS functions such as contract administration, contract procurement, dispute resolution and dispute drafting. Government authorities, banks and other organizations still prefer personnel from finance, legal and engineering to provide these services, which is a scourge to QS profession. In addition, since major projects in the country are carried out with the aid of foreign grants or loans, they use procurement policies dictating to employ foreign professionals in those projects. This hinders the employment opportunities of local professionals (Chandrasiri, 2010). Thus, quantity surveyors need to defend their profession and meet the locally and internationally increasing demand, by acquiring the essential competencies, which can be used to manage measure and improve the quality of professionals.

2.6 Professional associations dealing with the competencies of the Quantity surveyor in Sri Lanka

QS in Sri Lanka is governed by four main professional associations namely IQSSL, RICS, AIQS, and PAQS. These professional bodies make sure that practicing QSS are committed to maintaining the highest standards of professional excellence.

- **IQSSL** - This is recommended Chartered professional body in Sri Lanka that only represents the QS experts in the country. (IQSSL, 2015).
- **PAQS** - This is an international association that regulates the QS profession in Asia and the Western Pacific region. AIQS and RICS are underneath PAQS (PAQS, 2015).
- **AIQS** - This is a national regulatory body of the QS profession with chapters and divisions in all states. (AIQS, 2012).
- **RICS** - This was established in 1868 in the UK. It encompasses a broad range of professions covered by chartered surveyors, of which, QS is the one focused on the cost and procurement of construction projects (RICS, 2014).

2.7 Skills and competencies of the quantity surveyor

In the late 18th century, the need for quantity survey skills and competencies emerged with the trade rebellion, which saw extensive urban expansion, industrial development, and infrastructure development. Australian Institute of Quantity Surveyors (AIQS), 2012; Royal Institution of Chartered Surveyors (RICS), 2014; Perera et al (2011) identified QS as one of many professionals involved in the construction development and is straight accountable for the project's cost control not only over the construction phase but during the building's entire life. According to Lee, Perera, and Hogg (2013), "QSs are construction economists who undertake varied and detailed purposes to assist in cost-effective building and property development projects".

The RICS report published in 1971 (as quoted in Perera et al., 2011, p.2) defined QS as specialists in construction work measurement and valuation. As another example, RICS (1971 cited Ashworth, Hogg & Higgs, 2013) published the QS position in safeguarding that the resources of the building industry are used to the greatest advantage of society by supplying clients and designers, including financial project management and cost consulting services throughout the entire construction cycle. Due to the traditional role of cost control of construction, such as value management, risk management, arbitration, etc., the QS profession has acquired many methods under the current context. Thus, the ownership of current skills and the ability to validate a range of skills have become a requirement for employees to

survive in the construction segment to succeed in today's competitive world (Bertelsen and Sacks, 2007). Fanous and Mullins (2012) especially explain how the profession moves forward with effective delivery of knowledge and expertise while managing the impacts of the current functional sector problems and opportunities to obtain job merits.

2.7.1 Skills of the quantity surveyor

As Jayamathan (2006) explained skill is a vital component in the future success and increase of a profession. Chapman (1983 cited Jeyamathan, 2006) defined that skills is the basic individual attributes required to continue the job finely. Moreover, a study on "Importance of Skills and competencies of QS" by Husain et al. (2010) facilitated the discussion introducing skills, such as administrative skills, interpersonal skills, self-confidence skills, critical thinking, negotiation, coordination, conflict resolution, and technology skills. Further skill can be innate or acquired and applied to general or specific aspects of the QSs work (Dada & Jagboro, 2012). Moreover, Low (2003) stated that dissimilar companies require graduates with diverse competences (Burnside & Westcott, 2009). Further stated that ability to handle complex information and communicate it effectively and that QS is compulsory a variety of other skills such as personal and intellectual attributes, rather than specialist subject knowledge and to be flexible and work with efficiency.

Besides, the skills essential for quantity surveyors are published by professional quantity surveying associations such as (RICS, 2014; AIQS, 2012; IQSSL, 2015, PAQS, 2015). They are listed in Table 2.1 with the findings of other researchers where she has identified the skills of a professional quantity surveyor. According to the literature review found out from the perspective of Quantity Surveying, the skills of QSs have summarized in Table 2.1.

Table 2.1: Skills of the QS

Skills of the QS	Author
<p>Analytical/analysis skill</p> <p>The ability to dividing something into its constituent parts to aid understanding</p>	<p>RICS (2014), IQSSL (2015), AIQS (2012), PAQS (2015)</p>
<p>Appraisal/evaluation</p> <p>The ability to assessing the worth or value of something</p>	<p>RICS (2014), IQSSL (2015), AIQS (2012), PAQS (2015)</p>
<p>Communication</p> <ul style="list-style-type: none"> • Ability to communicate effectively. • Suggestion fact or ideas into a complex entire • Make written suggestion in a formal way that carries meaning. 	<p>RICS (2014), IQSSL (2015), AIQS (2012), PAQS (2015)</p>
<p>Documentation</p> <p>The ability to controlling resources to obtain value-added.</p>	<p>RICS (2014), IQSSL(2015), AIQS (2012), PAQS (2015)</p>
<p>Management</p> <ul style="list-style-type: none"> • Ability to communicate effectively. • Distinguish the need for cost-effective use of appropriate resources • Realize the process of quality control and declaration • Identify user and client needs and the process for their satisfaction 	<p>RICS (2014), IQSSL (2015), AIQS (2012), PAQS (2015)</p>
<p>Quantification</p> <ul style="list-style-type: none"> • Capability to comprehend and apply the standard method of measurement related to the area of practice. • Recognize and apply standard phraseology of building trades and elements • Measure, enumerate and measure. 	<p>RICS (2014), IQSSL(2015), AIQS (2012), PAQS (2015).</p>
<p>Teamwork</p> <ul style="list-style-type: none"> • Ability to work with people of different ages, genders, occupations, and regions. • Occupied as an individual and as a member of a team. • Meaningful how to define a role as a part of a team • Classifying the strengths and weaknesses of team members. 	<p>AIQS(2012), PAQS(2015).</p>
<p>Problem- solving</p> <ul style="list-style-type: none"> • Developing creative, innovative solutions • Testing assumptions • Using mathematics to solve problems 	<p>RICS (2014), IQSSL(2015), PAQS (2015).</p>
<p>Self-management</p> <ul style="list-style-type: none"> • Having a personal vision and goals. 	<p>AIQS(2012),</p>

Skills of the QS	Author
<ul style="list-style-type: none"> • Taking responsibility 	PAQS(2015).
Planning and organizing <ul style="list-style-type: none"> • Having a personal vision and goals. • Evaluating and monitoring own performance. 	IQSSL(2015).
Planning and organizing <ul style="list-style-type: none"> • Being resourceful • Collecting, analyzing and organizing information • Predicting risks, evaluation alternatives. 	IQSSL(2015).
Technology <ul style="list-style-type: none"> • Being resourceful • Collecting, analyzing and organizing information • Predicting risks, evaluation alternatives 	IQSSL(2015)
Lifelong learning <ul style="list-style-type: none"> • Being resourceful 	IQSSL(2015)
Initiative and enterprises. <ul style="list-style-type: none"> • Familiarizing to new situations and being creative • Taking initiative and making decisions • Classifying chances not obvious to others • Interpreting thoughts into actions 	RICS(2014), IQSSL(2015)
Leadership <ul style="list-style-type: none"> • Ability to prime, take responsibility, and offer views and direction to attain organizational goals. 	Dada and Jagboro (2012)
Critical thinking <ul style="list-style-type: none"> • Capability to identify the strengths and weaknesses of substitute solutions, conclusions or methods to problems. (Procurement paths, offering method) using logic and reasoning to identify. 	IQSSL(2015), Dada and Jagboro (2012), Husain et al. (2010)
Conflict resolution <ul style="list-style-type: none"> • Many projects encounter conflict at some stage, but if left unmanaged, it can quickly derail the entire process. 	IQSSL(2015), Husain et al. (2010)
Interpersonal <ul style="list-style-type: none"> • Demonstrate self-confidence time management self-motivation and enthusiasm. • Ability to understand others feeling in the team and stakeholders. 	RICS (2014), IQSSL(2015), AIQS (2012), Husain et al. (2010)

Skills of the QS	Author
Administrative <ul style="list-style-type: none"> Comprises making decisions and the timely flow of information and results to enable completion of the project as essential by the contract documents counting review and opinion of the construction project. 	Husain et al. (2010S)
Confidence <ul style="list-style-type: none"> Do trust, faith, self-assurance, confidence fell a QS make positive and prepared for a task he/she has to perform. 	Dada and Jagboro (2012), Husain et al. (2010)
Presentation <ul style="list-style-type: none"> QS needs in delivering effective and engaging presentations to a variety of audiences in sector. 	Dada and Jagboro (2012),
Negotiation <ul style="list-style-type: none"> Ability to a delicate balance between ownership of your principles and the ability to compromise. 	Husain et al. (2010)
Computer skills <ul style="list-style-type: none"> Appreciate and use fundamental knowledge of computers relevant to the job role. 	RICS(2014), IQSSL(2015), AIQS (2012), PAQS(2015)
Coordination <ul style="list-style-type: none"> Ability to adjust actions about others' actions related to the resources (to achieve a higher degree of operational efficiency for a construction project). 	Dada and Jagboro (2012), Husain et al. (2010)
Content strategy <ul style="list-style-type: none"> Ability to identify clients/developers and their needs as well as deliberately directing the organization resources to satisfy them. 	Dada and Jagboro (2012)
Efficiency <ul style="list-style-type: none"> Ability to accomplish something with the least waste of time and effort, competency in performance. 	Dada and Jagboro (2012), (Hesketh, 2000; Gammie et al., 2002 cited Geoff and Debra, 2010).
Legal familiarity <ul style="list-style-type: none"> laws and guidelines are applicable to the construction industry's numerous forms of building and construction agreements. 	RICS (2014) , Dada and Jagboro (2012).
Flexibility <ul style="list-style-type: none"> The capability of the system to answer to change by taking suitable action 	Dada and Jagboro (2012).

2.7.2 Competencies of the Quantity Surveyor

Competency has been defined by slews of authors. Holmes and Joyce (1993) defined competency as a description of an action, performance or consequence which a person should be able to prove, or the ability to transmission skills and knowledge to new circumstances in the work-related area. Bertelsen and Sacks (2007) express competency as something in which a person who works in a given occupational area should be able to do. As stated by Jeou-Shyan et al., (2011). Meyer and Semark (1996) depict ability as the exhibit of coordination of information, aptitude, individual qualities, and worth direction. Wang (2014) demands that skills give a typical social string, a language for progress, a system for contemplating greatness and a method of conveying what's to come. Further Wang (2014) depicted a legitimization for an investigation of the capabilities required of QSs is that the capacity of the amount reviewing calling to meet extraordinary and changing customer needs and to develop the market for amount studying administrations relies upon the information base of the calling.

The amount looking over calling faces dangers to its customary jobs and capacities because of changing customer needs in the development business propels in innovation and the specific needs of a creating economy (Gayathri, 2014). The quantity surveying profession faces threats to its traditional roles and functions as an outcome of varying client needs in the construction industry improvements in technology and the particular needs of a developing economy (Gayathri, 2014). (Cartlidge, 2012) has expressed able QSs must have a scope of abilities, information, and understanding which can be applied in a scope of settings and associations.

Competency is characterized as a portrayal of an activity, conduct or result which an individual ought to have the option to illustrate, or the capacity to move aptitudes and information to new circumstances inside the word related region (Holmes and Joyce, 1993 refered to Nkado and Meyer, 2001). Gayathri , (2014) has expressed the procedure of professionalization requests that a calling should assume liability for an endorsed collection of information by first, characterizing the considerable field of information that the expert should order, and also, the way toward applying that

information. They also explained competent QS "must have a range of skills, knowledge, and understanding which can be applied in a range of contexts and organizations" (Gayathri, 2014). The competency in individual aspects can be found in the study of Simms (2012), who concludes that employee competencies are characteristics related to job performance that make a positive difference. Further Ofori, (2012) describes these characteristics consist of observable behavior such as personality traits, values, motives; and knowledge, skills, and abilities. Competencies of QSs Proficient amount studying affiliations, such as the Royal Institution of Chartered Surveyors (RICS), The Australian Institute of QSs (AIQS) and the Institute of QSs Sri Lanka (IQSSL) have recognized the competencies that QSs essential to attain as professionals (AIQS 2012; RICS 2014; IQSSL 2015). Table 2.2 speaks to these alongside the competencies recognized by past examines considers. The RICS bunches QSs skills into three classifications as compulsory, center and discretionary abilities while different foundations distinguish them as just center and discretionary capabilities or as just center capabilities.

Table 2-2: Competencies of QSs from literature.

Sr No	Competencies of quantity surveying	Authors						
		a	b	c	d	e	f	g
1	Strategic planning	✓	✓	✓	✓			✓
2	Budgetary process	✓	✓	✓	✓			✓
3	Cost estimating	✓	✓	✓	✓	✓		✓
4	Cost planning	✓	✓	✓	✓	✓	✓	✓
5	General procurement advice	✓	✓	✓	✓	✓		✓
6	Quantification, measurement	✓	✓	✓	✓	✓		✓
7	Tendering process	✓	✓	✓	✓	✓	✓	✓
8	Account management	✓	✓		✓			✓
9	Construction change management	✓	✓		✓			✓
10	Claims and dispute resolution	✓	✓			✓	✓	✓
11	Financial audit	✓	✓	✓				✓
12	Resource analysis	✓	✓	✓				✓
13	Computer services	✓		✓		✓	✓	✓
14	Construction technology	✓	✓	✓			✓	✓
15	Government regulation and law	✓	✓	✓			✓	✓
16	Arbitration	✓	✓			✓	✓	✓
17	Expert witness / evidence	✓					✓	✓
18	Business management	✓	✓	✓		✓	✓	✓
19	Research and development	✓	✓				✓	✓
20	Cost information database	✓	✓				✓	✓
21	Feasibility studies	✓	✓	✓	✓	✓	✓	✓

a- AIQS (2012) , b- RICS (2014) , c- IQSSL (2015), d- PAQS (2015) , e- Dada & Jagboro, (2012), f- Yogeshwaran et al. (2014) , g- Yogeshwaran et al. (2018)

Sr No	Competencies of quantity surveying	Authors						
		a	b	c	d	e	f	g
22	Life cycle cost analysis	✓	✓	✓		✓	✓	✓
23	Tax depreciation	✓	✓	✓			✓	✓
24	Special assessments	✓	✓	✓			✓	✓
25	Technical audits	✓					✓	✓
26	Technical due diligence	✓	✓				✓	✓
27	Compliance issues	✓	✓				✓	✓
28	Project value management	✓	✓	✓		✓	✓	✓
29	Project management	✓	✓	✓		✓	✓	✓
30	Project risk management	✓	✓	✓		✓	✓	✓
31	Quality assurance	✓	✓				✓	✓
32	Contract administration		✓	✓	✓	✓	✓	✓
33	Insurance		✓	✓		✓	✓	✓
34	Property investment funding		✓				✓	✓
35	Development appraisal		✓	✓		✓	✓	✓
36	Facility management					✓	✓	✓
37	Economic of construction		✓			✓	✓	✓
38	Personal and interpersonal					✓	✓	✓
39	Professional practice		✓	✓		✓	✓	✓
40	BIM (Building information management)		✓	✓			✓	✓
a- AIQS (2012) , b- RICS (2014) , c- IQSSL (2015), d- PAQS (2015) , e- Dada & Jagboro, (2012), f- Yogeshwaran et al. (2014) , g- Yogeshwaran et al. (2018)								

2.8 Involvement of Quantity Surveyors in property development.

Many property development companies higher revenue engineers, QSs, and other professionals, such as Valuers, etc , will create new employment opportunities in the country and are made up of commercial property developments. Lenard, (2000).Further, Lenard (2000), states many professionals in the construction industry in the now rather than the usual jobs to join the mission of the property development sector jobs. "As management consultant chartered surveyor," centers on the report (1991) stated that; "Construction and property management consulting or asset resource management consulting in the field of construction & property if you want to retain its status as the leading advisors, research industry needs to address, which is a newly emerging market".

Ashworth, Hogg, & Higgs, (2013) have stated the size of the surveyors in the field of property development and wider opportunities need to be good. Further, describe QSs in their profession today are turning to new directions in their lives and they will grow in line with newly emerging employment opportunities. QS can make a portion of changes in the property development sector there (Nagalingam, Jayasena, & Ranadewa, 2013). QSs property developments have an important role to play. Although as per the Bertelsen and Sacks, (2007) QSs have to identify opportunities to work with it as well. Further says there are many graduate level surveyors engaged in the property development industry today.

2.9 Property development

Usilappan (2013) described property is a principal component of a national level economy and with the time, the demand for the land and property resources changed. Further Usilappan (2013) states the land is becoming a very scarce resource in the world and in the case of the existing buildings they are also becoming less suitable for the present uses. Although Dubois & Gadde, (2012) mentioned demand for the property has enhanced to a top level, hence the property development field is presently finding on the ways of productive and minimize the resource waste uses of the field.

Property expansion sector, construction and utilize of sales/funding laid and urban efficiency and urban quality in both a significant measurement of an algorithm (Alyami & Rezgui, 2012). Growing and sustainability to certify that, in city areas, production and locations and architectural types the demand dynamic and unpredictable building sites and factories needed to restore the ability to change the background (Ebohon, 2001).

2.10 Importance of property development

The development of the property of any country contributes a large part of its gross domestic product (Bourdea, 1999). According to the Central Bank of Sri Lanka in 2018, the percentage share of gross Domestic Product by property developments industry is 26.1% and it depicts the significance of property development. Other way, in Sri Lanka as a developing country, the development of the property is having a boost demand. Presently it has note popular influential and evaluating the overall performance of the financial sector in the construction industry as a main element.

2.11 Types of property development

Many authors who have written on property development, have given many definitions to define what property development is. Dominy, (2013) says; "The word 'development' infers a state of change. In further examination, Dominy, (2013) has defined main four types as Construction of new buildings, Redesigning, Refurbishments and Additions/Omissions. As per Dominy, (2013) construction of new structures can be classified, construction of new structures on new grounds or Greenfields" and complete destruction of existing structures and supplanting them with altogether new structures. The motivation behind this new structure might be altogether not the same as the existed one or perhaps for a similar reason. These kinds of lands are classified "Brownfields". Upgrading can be arranged as overhauling to make them increasingly appropriate for their current use and updating to make them progressively reasonable for exchange employments. Further Dominy, (2013) states repairs make them increasingly suitable for the present use by improving the nature of building materials, completes, and other fit - outs as

furniture, and so on and augmentations/exclusions may build/decline of usable floor territory to suit the new use.

Dawson, (2014) expressed Revamping includes the way toward rolling out restorative improvements to a property to upgrade its appearance to potential purchasers or inhabitants. It doesn't include changes to the structure or texture of a structure. Furthermore Dawson, (2014) depicts overhauling as a reestablish it to its unique condition through remaking. Probably the most ways for property business is to a purchase a property with ease, update it and sell it at benefit. Including and exclusion some piece of the property upgrade the significant estimation of property. Schoenmaker and Arno,(2015) characterized property advancement like development of new plug and private structures to a great extent decided the future spatial circulation of private areas and it very well may be improve the conditions where individuals live, work and unwind. Further Schoenmaker and Arno, (2015) states right now, Condos are confronting a switch of idea of homebuilders and customers from "items that are sold as worked" to "items that are fabricated well to be sold." To agree to such change, homebuilders think about houses as items and offer different types of assistance to fulfill appeal and prerequisite to meet the desire for the market separation. To guarantee coherence in changing lodging market, firms endeavor to create lodging items to improve the private fulfillment. Ishak,(2018), referenced that broad attention to the necessities to renovate building and to modernize with most recent techniques to oblige present day building administrations meets the manageable motivation. The importance of renovation is focused on long haul re displaying of building, tending to imperatives, for example, course and expanding the potential offered by the site and building assent. One of the regularly referred to boundary and difficulties for restoration rather than new form is simply the intrinsic unpredictability of the works. Now, by considering the renovation standards from change points of view in building industry will make the solidness condition for present and group of people yet to come in all encompassing long haul advantage. The term development of new structure in property improvement part characterized by the Cadman and Rosalyn, (2015) is a procedure that includes changing or strengthening the utilization of land to create structures.

According to the literature e review found out, types of property developments are summarized in Table 2.3.

Table 2-3: Types of property development

Sr No	Type of property development	Authors				
		a	b	c	d	e
1	Construction of new buildings <ul style="list-style-type: none"> Construction of new buildings on new lands or and comprehensive destruction of existing buildings and replacing them with entirely new buildings. 	✓		✓	✓	✓
2	Redesigning <ul style="list-style-type: none"> Redesigning to make them more suitable for their existing use and redesigning to make them more suitable for alternate uses 	✓	✓		✓	✓
3	Refurbishments <ul style="list-style-type: none"> More suitable for the present use by improving the quality of building materials, finishes, and other fit-outs as furniture, etc 	✓	✓		✓	
4	Additions/Omissions <ul style="list-style-type: none"> Increase/decrease of useable floor area to suit the new use 	✓	✓			✓
a- Dominy, (2013) b-Dawson,(2009) c- Schoenmaker And Arno,(2015) d-Ishak,(2018) e- Cadman & Rosalyn, (1995)						

2.12 Property development process.

Yardney, (2016) expressed property Progression includes a wide scope of exercises and procedures from buying area to building and creating offices. Further Yardney, (2016) characterized property development is "the consistent reconfiguration of the manufactured condition to address society's issues." Greg and Ferdinand, (2010) expressed property advancement is generally viewed as a coordinated procedure rotating around various parts that interface particular stages in the improvement cycle. Fisher, (2005) states the improvement procedure isn't dynamic however

identifies with a genuine site and the area, physical character and lawful responsibility for legitimize their different thought in the advancement procedure.

Further Fisher, (2005) states most property development texts include an account of the stages or stages of the development process, though the headings are never the same. Fisher, (2005) defined the process of property development sector as **1) Development Appraisal-** Estimating the financial viability of the proposed project, **2) Preliminary Market Survey-** Investigating trends in the demand for accommodation, competing supply, rents and prices, needed to reduce uncertainty and support the feasibility study, **3) Acquisition of site-** Acquisition of full legal title to the site or sites needed for the project including adjacent land, access, leases, license and other rights, **4) Design-** Balancing the requirements of aesthetics, engineering, occupier functionality, cost, planning and client requirements to produce the optimum design for the site, **5) Financing-** Seeking and providing short-term funds to pay for site purchase and construction, investigating sources of longer term financing, **6) Selection and appointment of contractor-** Deciding on the most appropriate means to procure construction works and associated professional services, including estimating and tendering and the negotiation and execution of contracts, **7) Construction-** The physical processes of site remediation, infrastructure provision, engineering, construction and building. **8) Marketing-** Presenting the advantages of the project to possible occupiers using an appropriate mix of media, **9) Selling-** Negotiations between the developer and potential purchasers over the price and other terms of the sale.

Bulloch and Sullivan, (2009) mentioned property development project having an eight stages which are as **1) Inception of an idea** - A designer creates a thought for a specific undertaking regarding size, scope, item type for a specific topographical zone. **2) Refinement of the idea** -Refinement of the thought The designer starts to distinguish locales with fitting locational qualities and financial aspects and endeavors to deal with the site. **3) Feasibility** - A conventional Feasibility process is begun where the engineer employs experts to direct market and attractiveness look into, starts a proper plan process, starts privileges and endorsement exchanges,

orchestrates obligation and value financing, and assesses costs and constructability.4) **Contract negotiation** – Composed authoritative understandings are started with every single key member. Development and changeless obligation and value are arranged and organized. A temporary worker is held to manufacture the task. 5) **Formal commitment** – All the agreements haggled in Stage 4 are approved and become effective.6) **Construction-** The venture is built by the temporary worker and the engineer deals with the procedure.7) **Completion and formal opening** – The development is finished and working administrators start the way toward setting up the structure for inhabitation 8) **Property, asset and portfolio management-** All parts of dealing with the capital enhancements over their monetary lifecycle are started. These incorporate upkeep, discharging, renegotiating, and demeanor.

Further Cadman and Rosalyn, (2011) recorded seven periods of property development process as **1) Inception** - Advancement is started when either a bundle of land/site is viewed as appropriate for an alternate or increasingly escalated use or interest for a specific use prompts a quest for a reasonable site, **2) Evaluation** - This is the most significant stage of the advancement procedure as it directs the dynamic of the engineer all through. Assessment incorporates statistical surveying, both when all is said in done and explicit terms, and the budgetary evaluation of the proposition, **3) Acquisition** - When the choice to continue is taken, there are numerous arrangements to embrace before the site can be gained and the advancement began. Legitimate examination, Ground examination, Account and so on., Structure and costing - Plan is a practically constant procedure running in corresponding with the different stages, getting dynamically progressively point by point as the advancement proposition increments in sureness. The designer may have point by point information on what configuration is required as the reasonable occupier is known or has been made sure about, **4) Design and costing** - Any turn of events (with a couple of minor exemptions), which by legal definition includes a difference in use or a structure activity, requires arranging authorization from the neighborhood arranging authority preceding its beginning, **5) Design and costing** - An engineer must be fulfilled that all the important starter work has been completed

before any considerable responsibility is made identifying with the turn of events. Preferably all the proper contributions of land, fund, work and materials, and the obtaining of legal authorizations must be sufficiently haggled before any understandings are marked making the designer at risk for any significant cost of cash, **6) Permissions** - Usage starts once all the crude materials of the advancement procedure are set up. A dedication has now been made to a specific site and to specific structures at a specific cost spread over a specific time, **7) Commitment** - This period of advancement, however frequently the last stage, should be at the front line of the engineer's musings from the commencement of the plan.

As Altona, (2012) mentioned, the property development involves many stages or stages from the concept of receiving of the entrepreneurial profit by the developer and the development process is conditioned by the nature of the parties who are involving in the development and the ways and behavior of them too. It can be outlined as follows.

- **Concept** - The Concept is where an engineer gets his originally thought on a turn of events. Further, in this stage, the engineer gets just a thought of forming something into a business property and having a benefit by selling it. In spite of the fact that at this stage the designer has very little an unmistakable thought on what kind of property is he going to construct and what might be the advertising systems used to sell the item, and so on Altona, (2012).
- **Preliminary Market Survey** - As Altona, (2012) clarifies in their compositions, an engineer who has the thought or the idea of advancement of the property needs to do a starter advertise study straightaway. Through this overview, what kinds of properties have more appeal in the market, which plays have explicit requests for specific sorts of properties, what are the potential costs and rate that the property can be sold or leased, and a lot more subtleties can be recognized by this primer to a willing engineer.
- **Development appraisal** - The planned engineer needs to do an improvement examination to comprehend whether the undertaking is plausible and the profits

of the task. Further, under this, financial achievability, specialized attainability and lawful possibility must be thought of.

- **Identification and acquisitions of the site** - After settling on the property and the region where the designer plans to do the turn of events, he needs to discover and obtain an appropriate site. Further expresses the designer needs to consider brownfields when on the off chance that he can't locate an appropriate green field that fulfills his prerequisites.
- **Appointment of design and consultancy team** - According to Altona, (2012) after the procurement of an appropriate site for the turn of events, the engineer needs to name a structure and consultancy group to do the turn of events and discussion work for the designer. As per Dubois and Gadde, (2012), during the improvement procedure, the structure group should give their consideration to the parts of willing purchasers as well. Finding the most appropriate obtainment strategy for the development and assessing and other offering and arrangement work must be finished by this consultancy group (Cheah and Ting, 2003)
- **Detail design of development** - From the phase of arrangement of the advisor, the plan technique goes on with the cooperation of the two gatherings that is the designer and the expert. Here the engineer presents his necessities on the advancement with the advisor or the originator (Altona, 2012).
- **Obtaining approvals** - For the advancement of business properties, it is required to get different endorsements from numerous specialists and organizations relying upon the kind of property (Altona, 2012).
- **Arrangement of finance** - Arrangement of account the engineer needs to execute the financing technique that he has chosen in this stage. The chose technique might be a bank advance or pre-deals or some other accessible choice (Altona, 2012).
- **Selection and appointment of a suitable contractor** - After the game plan of account then the engineer and his advisor group should locate a reasonable

contractual worker to execute the physical development of the property. Arrangement should be possible through an offering procedure or dealings (Altona, 2012).

- **Construction** - The physical development of the property begins with the handover of the site to the temporary worker. There after that the designer needs to screen crafted by contractual worker. This incorporates staying away from beyond what many would consider possible additional expenses and postponements in development (Altona, 2012).
- **Marketing, Selling and Completion** - At the finish of the development, the engineer needs to utilize a legitimate promoting procedure to sell the item. "He masterminds the primary letting or the offer of the turn of events" (Harvey, 1991, p.76) Negotiations did between the designer and potential clients with respect to the terms and states of the deal. Toward the fruition authorizing, giving over and control of the structure is occurring (Altona, 2012).
- **Execution of the management process** - According to Singh and Williams et al. with the finishing of the item it should utilize a fitting lifetime property the board procedure for the administration of the property until the finish of its monetary life. Altona, (2012) Stated that property the board is a financial assistance intended to make the ideal come back from the property all through its monetary life and in that property the executives procedure and the property chief should assist the speculator with achieving his profits.

According to the literature review found out Stages of property development process are summarized in Table 2.4.

Table 2.4: Stages of property development matrix

Sr No	Stages of property development	Author				
		a	b	c	d	e
1	Concept <ul style="list-style-type: none"> The place where a developer gets his first thought on some kind of development 	✓	✓	✓		✓
2	Preliminary market survey <ul style="list-style-type: none"> What types of properties have higher demand in the market, Which plays have specific demands for certain types of properties, What are the possible prices and rate that the property can be sold or rented out, Need many more details can be identified by this preliminary to a willing developer. 	✓			✓	✓
3	Development appraisal <ul style="list-style-type: none"> Need to understand whether the project is feasible and the returns of the project under this, economic feasibility, technical feasibility & legal feasibility have to be considered 	✓	✓		✓	✓
4	Identification & acquisition of site <ul style="list-style-type: none"> Find and acquire a suitable site. 	✓	✓	✓	✓	
5	Appointment of design and consultancy team <ul style="list-style-type: none"> To appoint a design and consultancy team to do the development and consultation work for the developer. 	✓			✓	
6	Detail design of development <ul style="list-style-type: none"> Here the developer presents his requirements on the development with the consultant or the designer. 	✓	✓	✓	✓	
7	Obtaining of approvals <ul style="list-style-type: none"> It is required to get various approvals from many authorities and institutions depending on the type of property. 	✓	✓			
8	Arrangement of finance <ul style="list-style-type: none"> To be implementing the financing methodology that he has selected in this stage. 	✓	✓	✓	✓	
		a- Altona, (2012) b- Yardney,(2016) c- Cadman and Rosalyn, (1995) d- Fisher, 2005 e- Bulloch and Sullivan, (2009)				

Sr No	Stages of property development	Author				
		a	b	c	d	e
9	Selection and appointment of a suitable contractor <ul style="list-style-type: none"> Find a suitable contractor to execute the physical construction of the property. 	✓		✓	✓	✓
10	Construction <ul style="list-style-type: none"> The physical construction of the property starts with the handover of the site to the contractor. 	✓	✓	✓	✓	✓
11	Marketing , selling & completion <ul style="list-style-type: none"> At the end, the developer has to use a proper marketing strategy to sell the product. 	✓		✓	✓	
12	Execution of property process <ul style="list-style-type: none"> After completion of the product it must employ an suitable lifetime property management process for the management of the property until the end of its economic life. 	✓	✓			✓
a- Altona, (2012) b- Yardney, (2016) c- Cadman and Rosalyn, (1995) d- Fisher, 2005 e- Bulloch and Sullivan, (2009)						

2.13 Property developer

The property developer is an entrepreneur who seeks his profit from the product and therefore the property development sector is again a profit-seeking business Alyami, & Rezgui, (2012). The private sector entrepreneurship has enhanced the profit to see kindness in the property development sector and here the developer plays the role of the supplier and the customers are the same customers who are being sought by the other products Altona, (2012). Further Altona, (2012) states private part advancement organizations arrive in an assortment of structures and sizes from small time groups to multinationals and their motivation is generally clear, to make a direct budgetary benefit from the procedure of improvement similarly that some other private division organization works, whatever their item. As indicated by Akadiri (2011), the engineers either work principally as merchants or financial specialists and most little organizations need to exchange, that is to sell the properties they create, as they don't have the capital assets to have the option to hold

their finished plans. Besides, Akadiri (2011, para.1) has depicted numerous bigger open cited advancement organizations liked to exchange improvements to gain by rising rents and values and shockingly they acquired cash on the quality of their future benefits and the dominant part went into receivership during the accident as their constrained resources were lacking to help them. As per Alyami, and Rezgui (2012), some endure however are viably constrained by their investors. Numerous dealer designers attempt to advance into financial specialist engineers as progress empowers them to hold benefits for speculation purposes. At the opposite finish of the scale, probably the biggest organizations as far as capital resources do scarcely any new advancement whatsoever, being substance to deal with their property portfolio and attempt just renovation and redevelopment work (Altona, 2012). Private engineers work exclusively as dealers as the market is intensely one-sided towards proprietor occupation, however many become critical landowners during the improvement procedure. The sort of improvement attempted changes impressively. A few organizations have practical experience in a specific kind of improvement, for example workplaces or retail, and furthermore specifically geological areas; others want to spread their hazard across types and areas. Some stay in an authority kind of improvement however spread a wide geological, even worldwide region. Property organizations plan their arrangement as indicated by the premium and ability of their chiefs and their impression of the overarching economic situations (Alyami, and Rezgui, 2012).

2.14 Uses of the Quantity Surveyor in property development and dealing with property developers

Quantity Surveyors are in basic terms ‘building accountants’ who exhort the designer on the possible expenses of the absolute structure contract and related expenses (Ofori, 2012). QSs job incorporates costing the structures delivered by the planner, managing the structure contract delicate, instructing on the most fitting structure concerning building contract, checking the development and endorsing stage installments to the contractual worker (Ashworth, Hogg, and Higgs, 2013). QSs are progressively getting engaged with the organization and the board of structure and assemble contracts. Like designers, their charge depends on a level of

the last agreement whole (Ofori, 2012). The decision of amount assessor ought to be founded on fitting experience and notoriety. The designer should choose an amount assessor who functions admirably in organization with engineers and different individuals from the expert group to create financially savvy structures. An amount assessor ought to have the option to give the engineer financially savvy thoughts as options to those proposed by the modeler (Lee, Channel and Willis, 2013).

The property developer faces the challenge in property development, and leaves different businessmen to manage the dangers identified with their organizations with which they are recognizable. In embraced advancement ventures for the utilization of different citizenry, the designer naturally acknowledges intrinsic dangers which most citizenry would be not able and reluctant to take all alone (Potts, 2008). Further, it describes this scenario is very much helpful for a developer to have a service of a QS for dealing with all those risks (Ofori, 2012). In the property development process, we can identify many places that QS can get involved to do much work to the betterment of the project by the use of his knowledge and skills (Cheunga, Cheunga, & Fellowsb, 2014). Lee, Trench & Willis (2013) stated QSs are very versatile professionals who are working in the construction industry that can take a challenging task. At present QSs tend to diversify into the relevant industries (Ashworth, Hogg, & Higgs, 2013). The property development industry is one of these targeted sectors of the economy. The reason for the ability to diversify is the vast range of skills and competencies with the QSs (Potts, 2008). According to

2.15 Summary

In this part we have taken an outline of the intricate action of property development, checking on it as a progression of stages including numerous on-screen characters with contrasting goals, working inside the general setting of the structure cycle and its cooperation with the business and credit cycles. Advancement might be started by any of the primary on-screen characters recognized yet it can just happen with the assent of the landowner. As advancement continues through the different stages the designer will turn out to be progressively dedicated and adaptability will be decreased, presenting the engineer to more serious hazard. Before designers make a pledge to both getting area and marking a structure contract they ought to get all the

vital assents, do all the fundamental examinations and secure the important money. What's more, a careful budgetary and market assessment ought to be done with the most ideal data to build up the task's feasibility and the occupier showcase. The accomplishment of an improvement may regularly rely upon karma instead of the engineer's judgment and aptitude, contingent upon the association of the structure and business cycle on consummation.

3.1 Introduction

Research methodology alludes to the standards and techniques for steady perspectives that are applied to a coherent assessment. It is the entire methodology reaching out from theoretical supporting to variety and assessment of data (Colleagues, Liu and Fong, 2008). The principal purpose of this segment is to format the investigation methodology for this assessment and particularly plot the investigation structure, which was finished this assessment. From the outset, it portrays the overview Procedure of this particular research and it shows absolutely the Procedure of this assessment in an exact manner using figures. Further, it shows the investigation structure alongside the methods for the assessment plan and relevance of research setup steps.

3.2 Research design

Research design is a legitimate method to coordinate different segments of research to address the issues in a successful manner (Punch, 2005). Further Creswell (2013) referenced that this gives an away from of how the ends are drawn from the information consistently and reasonably. In this manner it is imperative to build up the examination configuration to expand the legitimacy and feasibility of the result of the exploration.

While experiencing research, the analyst is given trust in the strength of the ends drawn from the information by a decent research plan (Rudestam and Newton, 2007). Giving an away from of the exploration structure, Kumar (2011) has characterized investigate plan as "a procedural arrangement that is embraced by the scientist to respond to questions truly, unbiasedly, precisely and financially".

3.3 Research approach

3.2 Research approach

The research approach alludes to sort out research exercises alongside information assortment to accomplish foreordained research points (Easterby-Smith, Thorpe, and Lowe, 2002). The key research approaches accessible are quantitative methodology, subjective methodology and blended methodology (Creswell, 2013). Nauom (2007) opines that the quantitative methodology is a goal, certainty discovering process dependent on clear proof and records.

The research approach can be understood as a general arrangement of how the analyst will approach responding to the exploration question. The examinations approaches direct in sorting out the exploration exercises to accomplish inquire about points. The research approach is basically sorted as under three principle approaches specifically quantitative, qualitative and mixed approach (Tan, 2002).

- **Quantitative approach**

The quantitative approach worried to measure the numerical information over a gathering of individuals to clarify variety in a wonder, circumstance, and so forth. This methodology progressively worried about the numerical information, as opposed to disparate thinking (Yin, 2009). Quantitative investigates are to gather and break down the numerical and static information, which are principally centered around estimating range, scale, recurrence of marvels (Kumara, 2011). Also, he expressed that it can contemplate the connections between the realities and how they are count with the discovering information of the exploration from the writing overview.

- **Qualitative approach**

Qualitative research approach can be viewed as an expletory examines strategy that permits understanding the hidden emotional information, for example, suppositions and conduct. This methodology is increasingly worried about elucidating information where respondents all the more effectively occupied with the conversation procedure Mauch and Park (2003)

3.4 Selected research approach for this research

This can be viewed as a sort of research approach where there are mixes of components in a quantitative methodology just as a subjective methodology Kothatri (2004) However, a blended methodology requires extensive time term for expansiveness and profundity of getting (Tan, 2002). A Quantitative research approach dependent on questionnaire surveys was utilized for this exploration. Consequently to acquire a quantifiable picture on the aptitudes and the capabilities of Quantity Surveyors in the property development a Quantitative research approach was chosen. To get the foundation information for the exploration on existing skills and competencies of the Quantity Surveyors and the property development exercises, a complete literature survey was done. In this writing study, much consideration was given to the skills and competencies of the Quantity Surveyors, since this examination intends to recognize the skills and competencies required by the Quantity Surveyors in the property development organizations to assume their job effectively in the property development area with the exploration issue, it was expected to distinguish the amount reviewing skills and competencies, sorts of property development and stages of property development ventures. Thus, greater amount reviewing skills and competencies were distinguished. Notwithstanding, there were no scientists done on this region and not many creators have recognized quantity surveyors involvement in property development. Hence, qualitative approaches, for example, expert questionnaire survey were required to watch extra skills and competencies in property development. Along these lines, this exploration was bolstered by a mixed approach method with predominantly quantitative.

3.5 Research process

The Research procedure comprises of a few stages which have masterminded successively to complete compelling exploration (Kothari, 2004). This examination is the focal point of the Sri Lankan property development segment, giving numerous chances to all development experts. That gave the plan to look into the job of the Quantity surveyor in the property development sector. This part gives a manual for the dissertation and has talked about kinds of Property development, the procedure

of property development and the fundamental skills and competencies of QSs in the property development division.

The research procedure for this specific research represents utilizing following Figure 3.1, essentially, a concise thought of the examination territory is finished with foundation study. The connection between Property development and quantity surveying will concentrate on this foundation study while the principle center will recognize skills and competencies of the amount assessor in accomplishing property development.

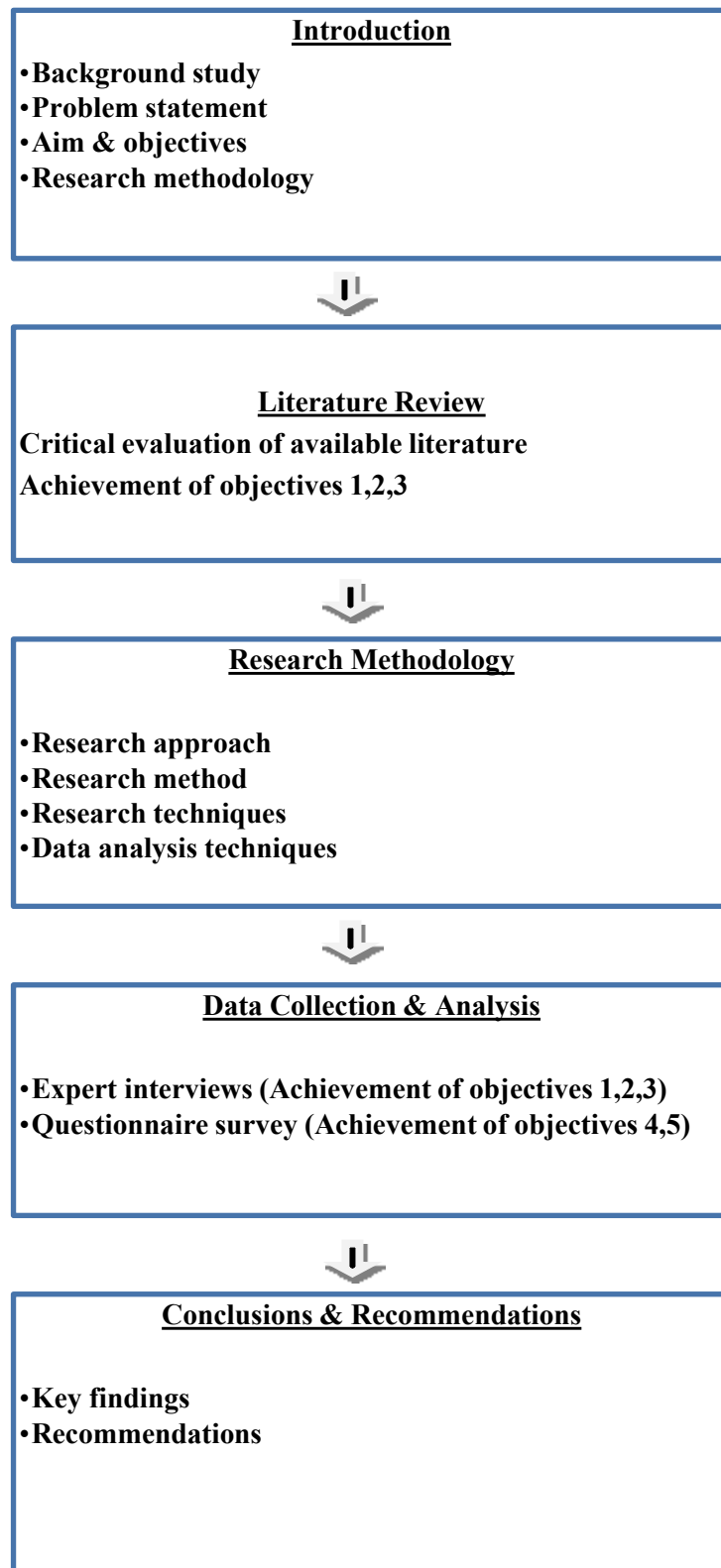


Figure 3-1 Research Process

3.5.1 Data collection Methods

There are various information collection techniques can be utilized when inquiring about as expert questionnaire survey, questionnaire survey, center gathering, perception, information extraction, and optional information sources Thomas and Brubaker (2008). The collection of information/data is viewed as social occasion all important data/information to accomplish the fundamental point/targets of the investigation. Strategy for information assortment depicted in efficient ways in the parts of how the information going to gather, where the information is to be the source and how the plan till usage of the questionnaire survey. Suitable research strategies are distinguished to work the examination further by gathering information to a superior information investigation (Hapuarachchi, 2007). There are various information assortment techniques in a quantitative research approach which are sorted under essential information and optional information, as delineated in Figure 3-2.

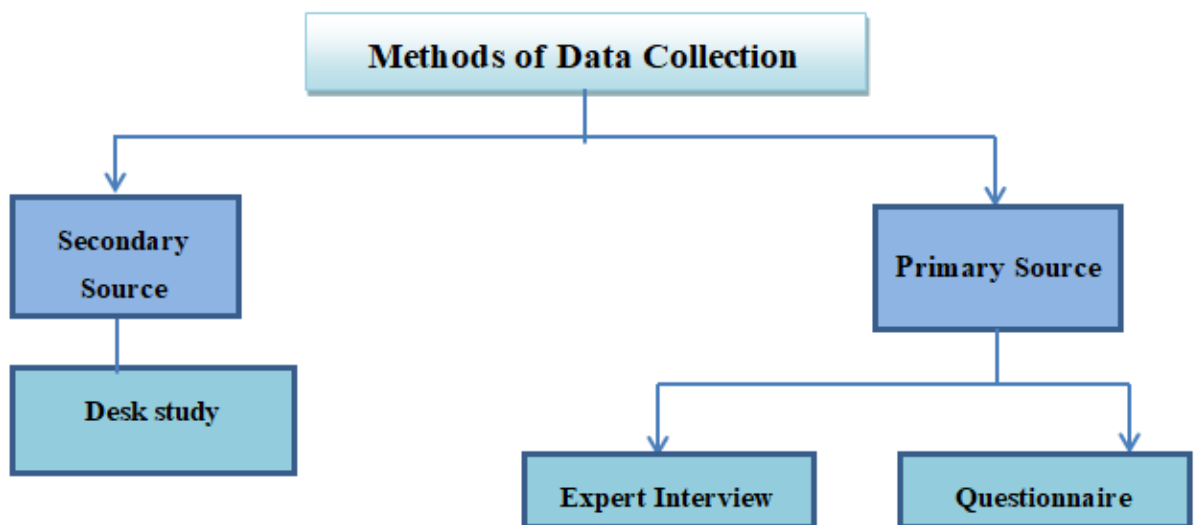


Figure 3-2 Data collection techniques of this research

Since this research was directed with a mixed approach with predominantly quantitative method and the essential sources were just thought to be, expert interview and questionnaires were selected as the research strategies to gather

information from Quantity Surveyors working in property development industry over 05 years' experience.

➤ **Desk review**

Desk review is a snappy and simple strategy for gathering information from existing sources. It diminishes information assortment time and adds to the precision of end, since the information is gathered from dependable, distributed sources. Further, it forbids interviewee bias and allows researchers to access to valuable information at little or no cost. Since desk review is used prior to primary research, it helps to clarify the research question and align the focus of large scale primary research (Prescott, 2008).

To achieve the aim of this research (Refer section 1.3), objective one, two and three are essentials. Therewith, target one, two and three were accomplished through an external desk review survey continued utilizing the skills and competencies published by IQSSL (2015), RICS (2014), AIQS (2012) and PAQS (2015).

➤ **Expert questionnaire survey**

Expert interview are utilized to gather information from Quantity Surveyor in Sri Lankan property development over 05 years' experience since expert questionnaire survey assists with gathering increasingly solid information and assessments.

➤ **Questionnaire survey**

For questionnaire survey, the discoveries from both literature review and expert questionnaire survey were utilized for additional approval and to accumulate more information. Questionnaire survey is a list of questions on papers given to respondents to comprehend what is normal and give the appropriate responses (Kumar, 2011). Questionnaire survey was utilized for this examination since it includes estimating Quantity Surveyors' perspectives on specific skills and competencies in identified with property development sector. Questionnaire survey was done with the Quantity Surveyors working in property development organization with over 05 years' experience/experts in Sri Lanka (respondents), who were chosen through convenience sampling method. Questionnaires are done to distinguish the stages where the involvement of Quantity Surveyors is essential,

Analyze the most significant skills and competencies of Quantity Surveyors at each stage of property development and analyze the most significant skills and competencies of Quantity Surveyors in property development.

The questionnaire consisting of three main sections that are presented below,

Section A (Background of Respondent) – The initial part of the segment clarifies essentially respondent background, respondent working organization, the position of an association, working involvement/experience in the property development organizations.

Section B (Information of the examination) - The second portion of the questionnaire showing each stage of the property development sector where the involvement of Quantity Surveyors is essential.

The objective gatherings in this research were Quantity surveyors working in the development projects. The questionnaire for the most part dependent on the size of 5 conventional measures, from 1 to 5 as per the degree of contributing.

1	2	3	4	5
Not Significant at all	Not Significant	Significant	Highly Significant	Very Highly Significant

In scale 1 means inclusion of QS in an alternate stages/stages of the property development sector not significant at all. 5 mean the inclusion of QS in various stages/stages of the property development projects profoundly critical.

Section C (Information of the research) – The third portion of the survey disclosing the components used to quantify the most critical skills and competencies required by quantity surveyor to act in property development (new building structure development) various stages. In scale, "1" signifies skills and competencies essential for QS in various stages of property development division are not critical by any means. "5" signifies skills and competencies fundamental for QS in various stages of the property development are greatly massive.

3.5.2 Population and sample

The chosen bunch for the survey study incorporates Quantity Surveyors who have working involvement with property development in new structure development. Testing characterized as the technique for choosing from a populace (Tan 2002 cited to Hamshyani 2007). The exploration centers around distinguishing the contribution of QS is fundamental in various stages/stages of the property development sector and recognize the critical skills and competencies basic/essential to perform QS job in an alternate stage of the property development division. The number of inhabitants in the examination test targets 100 nos the executives level QSs involvement with the Property development segment in Sri Lanka. The 77 number of questionnaires were disseminated to them to gather data for the investigation. 40 number of sample given accuracy on research work as well the greater variation in the study population concerning the characteristics. The sample includes a wide range of levels of quantity surveyors in an organization such as Directors, Deputy General managers, Project Managers, and chief quantity surveyors and quantity surveyors. The example incorporates a wide scope of levels of QS in, for example, Directors, Deputy General managers, Project Managers, and chief quantity surveyors and quantity surveyors.

3.5.3 Data analysis techniques

Data/Information investigation is a crucial action which gives the normal results of an examination procedure with understanding the most appropriate data assortment strategies. As per this examination, has utilized both expert meetings and questionnaires to gather information. Subsequently a content analysis and a quantitative analysis have been utilized to break down the information and to get precise outcomes.

➤ Analyzing expert questionnaire survey

Content analysis was the technique utilized for breaking down expert questionnaire survey. Content analysis gives a technique to examine expert questionnaire survey which is rule based and theory guided, while summing up the gathered information offering thought to significant thoughts, discoveries (Hsieh, and Shannon, 2005).

Subsequently, content examination was utilized for dissecting master meetings of this exploration.

➤ **Analyzing questionnaire surveys**

Information were gathered through the survey and prepared, sorted out, dissected and used to accomplish goals of the research. Raw data analysis incorporates survey assessment, arranging, altering, coding, and information cleaning process. Statistical package for social sciences (SPSS) software used to to analysis gathered information from the survey . The relative important index (RII) is utilized as an examination method for survey reactions, which has been utilized by numerous specialists to decide the overall significance of the attributes (Tayalan, Bafail, Abdulaal, and Kabli 2014). To identify the stages where the involvement of QS is essential, Analyze the most significant skills and competencies of QS at each stage of property development and Analyze the most huge aptitudes and skills of QS in property development from gathered information Likert Scale is utilized in examiner overview.

Likert Scale

Likert scale can be seen as the procedure of evaluating the different mindsets towards a declaration by mentioning that the respondent shows their tendency in a movement of short clarifications on a given extent of responses. It will in general be analyzed the general mindset or the appraisal of respondents and wrap up an investigation subject (Ginige 2005).

Relative Important Index (RII)

Relative important index (RII) is a strategy, which was utilized by a few scientists, for example, Nkado (2001), Jeyamathan (2005) and Tayalan, Bafail, Abdulaal and Kabli (2014) in comparative examinations. The procedure used to assess the gathered information was Relative Important Index (RII) (Using Eq 01) and rank the Skills, Competencies, types of property development and Stages of property development. In this way a positioning is relied upon comparative with the significance of such role and skills here Relative Important Index (RII) will be

utilized as the device for the investigation. For investigation of the organized survey required to set up a rundown of skills and competencies as indicated by the rank got by every skill and competency. The particular skills and competencies, sorts of property developments and stages/stages of property development evaluated as "Most essential", "Essential", "Medium Essential", "Medium essential "and "Not essential".

A similar instrument has been utilized by the Nkado (2001), Jeyamathan (2005), and so forth for the investigation of their organized survey to set up a rundown of skills and competencies as per the rank acquired by each skill and competency.

$$RelativeImportanceIndex = \frac{\sum_{i=1}^5 w_i x_i}{A \sum_{i=1}^5 x_i}$$

W_i : Weight assigned to ith response, W_i =1,2,3,4, and 5 for I =1,2,3,4, and 5 respectively.

X_i : Frequency of the ith response

A : The higher Weighting

i : - response category index = 1, 2, 3, 4 and 5 for **“Not Significant at all”**, **“Not Significant”**, **“Significant”**, **“Highly Significant”**, **“Very Highly Significant”**

As per Akadiri (2011), five significant levels are changed from RI values: high (H) (0.8 ≤ RI ≤ 1), high medium (H–M) (0.6 ≤ RI ≤ 0.8), medium (M) (0.4 ≤ RI ≤ 0.6), medium-low (M-L) (0.2 ≤ RI ≤ 0.4) and low (L) (0 ≤ RI ≤ 0.2).

3.6 Summary

The itemized procedure which was completed to continue with the exploration was obviously distinguished in this section. The background study was set up first which was trailed by the literature survey and a theoretical system. Expert questionnaire survey was led as the subsequent stage followed by a survey study to accomplish the point of the research. The gathered information has been examined to determine ends and proposals with factual techniques.

4.1 Introduction

This section presents and investigations the information gathered through expert questionnaire survey, questionnaire survey review and work area study. Very firstly, information gathered through expert questionnaire survey is examined where the relevance of literature review to the Sri Lankan setting will be investigated. Also, specialist input was used in planning the questionnaire survey. In this manner, the aftereffects of the survey overview the analysis will be explained.

4.2 Expert Questionnaire survey

The procedure of information assortment started with expert questionnaire survey where eight (8) industry specialists were met. The entireties of the respondents were quantity surveyors with more than twenty (20) years' experience in industry. Then the expert questionnaire survey was organized; for all intents and purposes all the respondents were quick to share their insight and experience by giving extra data relevant to the theme. The aftereffects of the expert interview were broke down utilizing manual examination.

4.2.1 Objectives of Expert Questionnaire survey

The essential goal of expert questionnaire survey was to satisfy the primary, second and third destinations of the exploration, which was to distinguish the skills and competencies of QSs, recognize the sorts of property development which require Quantity Surveying services and recognize the significant of the QS inclusion at various stages of property development. In addition, the expert questionnaire survey were useful in approving the literature review regarding the principal, second and third goals. The discoveries of both literature review and expert questionnaire survey were utilized to frame the detail questionnaire which was intended to achieve the last four and five goals of the exploration, which was to distinguish the most critical skills and competencies of QSs at each stage of property development and examine

the most significant skills and competencies of QSs in property development (Refer subsection 1.4 of Chapter 01).

4.2.2 Design of the Expert Interview Guideline

Expert interview guideline with rule was likewise included with open-finished inquiries for additional conclusions. Four inquiries were remembered for the expert interview guideline (Refer Appendix A). Regardless, each expert interview spread over around 20 to 30 minutes. The main inquiry was incorporated to recognize the skills of QSs, distinguish the competencies of QSs, recognize the types of property development which require Quantity Surveying services, distinguish the essentialness of the QS contribution at various stages of property development.

4.2.3 Profile of the Respondents

Eight number of expert/specialist QSs in the property development division were chosen as interviewees for the expert interview. The chose expert QS were knowledgeable about numerous sorts of associations, for example, contracting, consulting and client organizations. A concise presentation of interviewees is point by point in Table 4-1. As showed in Table 4-1, all the interviewees were experienced over 20 years, which fortify the legitimacy of the interview results which is depicted in the following subsection. All the interviewees had involvement with numerous types of property development undertakings and extraordinarily had decent information on the property development part in the Sri Lankan development industry.

Table 4-1 Details of questionnaire survey

Interviewee	Types of organizations	Experience	Designation
A	Construction and Property Developer	25	Director
B	Consultant organization	24	Director
C	Consultant Organization	27	Director
D	Construction and Property Developer	23	Director
E	Construction and Property Developer	20	Chief QS
F	Construction and Property Developer	23	Director
G	Consultant Organization	21	Senior QS
H	Construction and Property Developer	27	Senior manager

4.3 Analysis of the Outcomes of Expert Questionnaire survey

The literature survey gave experiences into distinguish the skills and competencies of QSs, recognize the types of property development and distinguish the stages of property development. Consequently four inquiries remembered for the expert interview guideline as distinguish the skills of QSs, recognize the competencies of QSs, and recognize the types of property development which require Quantity Surveying services, distinguish the significance of the QS association at various stages of property development. These were planned for determining to what degree the previously mentioned literature review were pertinent to the property development (new structure development) in Sri Lankan setting.

4.3.1 Results of questionnaire survey

The above discoveries of the literature review were additionally expanded with the expert questionnaire survey. Notwithstanding the social affair of more feelings for the above subjects, the discoveries of the literature review were given for the interviewees to evaluate the legitimacy of those discoveries. Distinguish the skills and competencies of QSs at each stage of property development. Be that as it may, practically all the discoveries of the literature survey were settled upon by the interviewees with barely any remarks. Just the extra suppositions which were assembled other than literature review discoveries were investigated

4.3.1.1 Skills of Quantity Surveyors required for property development.

According to the interviewees, the discoveries of the literature review with respect to the skills of Quantity surveying were agreeable. Notwithstanding the skills distinguished in the literature review, few other skills were pointed out by the interviewees, as presented in the Table 4.2, in point form as “Industrial memory”, “Professional membership”, “Knowledge in Social behaviour”, “Knowledge in economics”, “Market Condition”, “Lateral thinking across many fields”, “Contractual knowledge (FIDIC/SBD)”, “Cost feasibility” and “Cost responsibility”.

Table 4-2: Skills of QS required for property development

After literature review	After Semi Structured questionnaire survey
Analysis	Analysis
Evaluation	Evaluation
Communication	Communication
Documentation	Documentation
Management	Management
Quantification	Quantification
Teamwork	Teamwork
Problem solving	Problem solving
Self-management	Self-management
Planning and organizing	Planning and organizing
Technology	Technology
Lifelong learning	Lifelong learning
Initiative and enterprises	Initiative and enterprises
Leadership	Leadership
Critical thinking	Critical thinking
Conflict resolution	Conflict resolution
Interpersonal	Interpersonal
Administrative	Administrative
Confidence	Confidence
Presentation	Presentation
Negotiation	Negotiation
Computer skills	Computer skills
Coordination	Coordination
Content strategy	Content strategy
Efficiency	Efficiency
Legal familiarity	Legal familiarity
Flexibility	Flexibility
	Industrial memory
	Professional membership
	Knowledge in Social behaviour
	Knowledge in economics
	Market Condition
	Lateral thinking across many fields
	Contractual knowledge (FIDIC/SBD)
	Cost feasibility
	Cost responsibility

Interviewee "A" brought up "**Industrial Memory**" is basic, industry practice and standard inner corporate approach are required for property development organizations to keep up the task documentation. Undertaking records are significant in development extends as they guarantee 'memory' of the task. This is the main current record that has occurred whenever during the undertaking. Reports structure the system whereupon a case is worked without demonstrating a case on the double, and subsequently have minimal possibility of a reasonable outcome. Further expressed Task archives kept on a contemporaneous premise give a perpetual record that permits the point by point recreation, survey, and examination of occasions and activities of the venture. Further he has noted that "**Professional membership**" is another QS skill used in property development organizations that have QS and is related to their profession. He/she would list it on their resume as an indication they keep up with changes in their profession. In addition, the Interviewee "A" introduces another skill, "**Knowledge of Social Behavior**," and is described as social interaction, often within the same genre, which is often useful for one or more people. It is believed that social behavior originated because it worked for those involved.

Interviewee "B" stated that "**knowledge economy**" vital issue of restricted force needs. The present-day neediness and the poor way of life of the individuals of numerous retrogressive nations are because of poor assets, little creation and absence of innovation. In addition, states that "**Market Condition**" is one science, when viewed in relation to QS. It indispensable knowledge and skills talking issues like whether the property development project or service can be sold at reasonable prices or if there's a market place for it. Monetary circumstance is that to achieve budgetary unforeseen development, theory and work. The remarkable condition makes it less hard to begin a business make, recognize experience returns and look for some kind of employment. Negative conditions make advertises dynamically real and testing. Basic sorts of monetary circumstances cost limit, financing costs, the expense of soccer, business, extension and exhausting, and the obtaining of purchaser solicitation, costs and rule, inventories and contention.

Interviewee “C” stated that "**Lateral thinking across many fields**" is expressed that "Parallel deduction across numerous fields" is another significant aptitude which is to be considered as it is such a recognizable idea, that it's for all intents and purposes interchangeable with 'inventive reasoning'. The expression 'horizontal reasoning' is much of the time utilized conversely with 'innovativeness'. It can underestimate that imaginative individuals think distinctively to all of us. It's what makes them imaginative. The prevalence of horizontal reasoning is a demonstration of the imagination, efficiency and limited time vitality of its originator.

Interviewee “G” stated that "**Contractual knowledge (FIDIC/SBD)**" is another expertise that ought to be thought of. The key element for their prosperity as industry-standard lies in their reasonable way to deal with the jobs and obligations of the fundamental gatherings, just as the allotment and the executives of hazard. Hence, and the major explanation is FIDIC contract for the utilization of General Conditions which are appropriate in all cases the large number of fruitful tasks world. However, given that no two undertakings are the equivalent, FIDIC acknowledges that uncommon conditions will be required for venture explicit issues, dependent upon the situation. All FIDIC contracts, in this manner, contain direction on the arrangement of Specific Conditions and give instances of the territories where extraordinary arrangements might be required for a particular undertaking. To wander fundamentally from these rules is to build the danger of moving the reasonable idea of the agreement, and placing into risk the fruitful execution of the undertaking.

Interviewee “H” stated that with the skill of "**Cost feasibility**", one will have the option to know all the subtleties of the tasks and can after that composes them appropriately. The possibility study directed helps the gatherings engaged with recognizing different issues related with the undertaking like the strategic issue, work gracefully, and so forth which will be valuable in getting the answers for the issue. It simultaneously additionally helps in building up the various techniques for property development ventures like money related procedures, showcasing methodologies, and so forth. In this way it helps the association in settling on an educated choice.

Further pointed out "**Cost responsibility**" is another ability which is to be improved and expresses an expert QS has detail and extensive information on development and development techniques, just as the identifying with development activities and bookkeeping, to give cost and money related guidance. Further expresses that a duty bookkeeping financial plan is a report intended to follow the controllable expenses and incomes of an administrator just as diagram their proficiency and viability. As it were, a capable spending plan is a spending that organizations make for the costs and incomes that are constrained by a particular director. Since not all expenses can be constrained by administrators, it bodes well to make a financial plan explicitly outlining the costs that directors can control.

4.3.1.2 Competencies of Quantity surveyors required for property development

The present competencies of an expert QSs, which were recognized in the literature review, were acknowledged by all interviewees. Interviewees concurred that practically all the competencies required by a present proficient QSs are secured by the competency list which was made in Table 2.2. Although the skills distinguished in the literature review, hardly any different competencies were brought up by the interviewees, as introduced in the Table 4.3, in point structure, as, Community management, Property Valuation, Handing over the project inventory, COC Documentation (Certificate of Conformity) and Reporting structure (Material and cost).

Table 4-3 Competencies of Quantity Surveyor for Property development

After literature review	After Semi Structured questionnaire survey
Strategic Planning	Strategic Planning
Budgetary process	Budgetary process
Cost estimating	Cost estimating
Cost planning	Cost planning
General procurement advice	General procurement advice
Quantification and measurement	Quantification and measurement
Tendering process	Tendering process
Account management	Account management
Construction chain management	Construction chain management
Claims and dispute resolution	Claims and dispute resolution

After literature review	After Semi Structured questionnaire survey
Financial audit	Financial audit
Resource analysis	Resource analysis
Computer services	Computer services
Construction technology	Construction technology
Government regulation and law	Government regulation and law
Arbitration	Arbitration
Expert witness/ evidence	Expert witness/ evidence
Business management	Business management
Research and development	Research and development
Cost information database	Cost information database
Feasibility studies	Feasibility studies
Life cycle cost analysis	Life cycle cost analysis
Tax depreciation	Tax depreciation
Special assessments	Special assessments
Technical audits	Technical audits
Technical due diligence	Technical due diligence
Compliance issues	Compliance issues
Project value management	Project value management
Project management	Project management
Project risk management	Project risk management
Quality assurance	Quality assurance
Contract administration	Contract administration
Insurance	Insurance
Property investment funding.	Property investment funding.
Development appraisal	Development appraisal
Facilities management	Facilities management
Economic of construction	Economic of construction
Personal and Interpersonal	Personal and Interpersonal
Professional practice	Professional practice
BIM(Building Information Management)	BIM (Building Information Management)
	Community management
	Property Valuation
	Handing over the project inventory
	COC Documentation (Certificate of Conformity)
	Reporting structure (Material and cost)

Interviewee "B" expressed that "Community management" is frequently utilized reciprocally with social media management. And keeping in mind that it's very a key piece of any web based life procedure, dealing with your locale turns out to be increasingly more significant the greater client base becomes. Interviewee "E" expressed that "Property Valuation" is a review completed to help decide the present market estimation of a property. It is normally embraced by a home specialist or an autonomous valuer, regularly following up on the guidelines of the seller or a loaning foundation who are thinking about financing its buy. Purchasers may likewise demand a property valuation in the event that they are thinking about buying a property, notwithstanding basic reviews that evaluate its state of being. Before giving a home loan or renegotiating, a loaning foundation, (for example, a bank) may demand a valuation to guarantee the advance can be secured by the security estimation of the property. This is gives them with the certainty to loan the capital, realizing that if the home loan goes unpaid, they can recuperate any extraordinary sum by exchanging the property.

“Handing over the project inventory” was marked by interviewee “H” as very important competency of QS and further it describes as the transfer of authority and responsibility of the storehouse from one official to another. In this process a certificate of handing over of stores/Inventory must be prepared. A certificate of handing over is a form or certificate used in store signifying change of stores authorities. Further interviewee “H” states that **“COC Documentation” (Certificate of Conformity)** can be presented as an another extraordinary competency of the QS and it is given by an approved gathering (once in a while the maker, at times an autonomous research facility) and states that the item fulfills the necessary guidelines or determination. The COC can either be mentioned by a purchaser to guarantee the item being fabricated has been tried and passes the set standards inside a detail and meets both specialized and security necessities, or it would be a compulsory prerequisite as expressed by nation guidelines and law for certain item. Besides interviewee "H" expresses that "Reporting structure" (Material and cost) is another competency of QS and it portrays as present and explain the Fund's prerequisites for assessing and announcing venture costs, diagram adequate

cost estimation techniques and build up detailing position for different extents of work.

4.3.1.3 Types of Property development which require Quantity surveying services

All the kinds/types of property development which were distinguished in the literature survey were set apart as significant by interviewees and no proposal referenced which are summed up in Table 4.4.

Table 4-4 Types of property development which require Quantity Surveying services

After literature review	After expert interview
Construction of new buildings	Construction of new buildings
Redesigning	Redesigning
Refurbishments	Refurbishments
Additions	Additions

All the interviewees agreed with composing findings and expert interview with "B" has explained sorts of property development as the advancement of new structures on 'greenfield lands, the all-out pulverization of existing structures and their overriding with totally imaginative structures. He has explained this is once in a while named 'brownfield' redevelopment activity and commonly incorporates an absolutely new subject property use, appeared differently in relation to that which as of late won. The change of current structures through technique for rethinks to make them progressively suitable for their present usage. The alteration of existing structures by strategy for rethink to make them continuously is fitting for a substitute use, or, by virtue of unequivocal inheritance applications, a flexible re-use. The change of existing structures to construct the proportion of useable floor space - usually insinuated as 'increases'. the alteration of existing structures by strategy for rebuilding - making them progressively sensible for their present use or a

substitute/flexible re-use in a heritage setting, by improving the idea of building materials, wraps up.

4.3.1.4 Significance of the QS involvement at different stages of property development

Additional stages discovered in the literature review, few more stages were identified from expert questionnaire survey as presented in Table 4.5 as below.

Table 4-5: Significance of the QS involvement at different stages of property development

After literature review	After Semi Structured questionnaire survey
Concept	Concept
Preliminary Market Survey	Preliminary Market Survey
Development appraisal	Development appraisal
Identification and acquisition of site	Identification and acquisition of site
Appointment of design and consultancy team	Appointment of design and consultancy team
Detail design of development	Detail design of development
Obtaining of approvals	Obtaining of approvals
Arrangement of finance	Arrangement of finance
Selection and appointment of a suitable contractor	Selection and appointment of a suitable contractor
Construction	Construction
Marketing , selling & completion	Marketing , selling & completion
Execution of property process	Execution of property process
	Cost benefit analysis
	BOI rules and regulations
	Defects liability period

Notwithstanding what was distinguished in the literature survey, interviewee "B" depicted that "Cost-benefit analysis stage" as another stage of property development and it is a procedure of property development organization uses to break down cost choices. According to the expert interview "Development appraisal" stage characterized as the engineer needs to do an advancement examination to comprehend whether the undertaking is doable and the profits of the task under this,

financial practicality, specialized achievability and lawful attainability must be thought of. Anyway talk with "B" portrayed "**Cost-benefit analysis stage**" can be distinguished as independent stage because of the centrality/significance of procedure because of quotes ought to be deliberately thought of and contrasted with the predominant economic situations. Take a moderate perspective with regards to evaluating the expenses and the normal consequences of any undertaking including property overhaul. Further expressed the property development association or examiner aggregates the advantages of a circumstance or activity and afterward subcontracts the expenses related with making that move. Prior to building another plant or taking on another task, QS should lead money saving advantage examination to assess all the potential expenses and incomes that an organization may create from the undertaking. The result of the investigation will decide if the venture is monetarily doable or if the property development organization should seek after another task.

Further interviewee "B" depicted that "**BOI rules and guidelines**" (Leading body of Venture) of Sri Lanka gives help and counsel all through the speculation procedure. It is organized to work as a focal assistance point for financial specialists, which is submitted towards improving the nation's venture atmosphere. Finishing more presence in Sri Lanka, Leading group of Venture has made an impressive effect on the nation's financial turn of events. Having the vision of making Sri Lanka the most favored goal for supportable interest in Asia BOI is moving in the direction of pulling in and making sure about practical ventures for ideal usage of assets and gifts, through fiery advancement and fantastic speculator help while saving amicability with the regular habitat as a huge donor in the improvement of the national economy

Interviewee "G" stated that "**Defects liability period stage**" begins upon certification of practical completion and typically lasts six to twelve months. Interviewee "G" expressed that "Imperfections risk period stage" endless supply of reasonable consummation and commonly keeps going six to a year. During this period, the customer reports any deformities that emerge to the agreement chairman who chooses whether they are imperfections or whether they are in certainty support

issues. In the event that the agreement manager considers they are deserts, at that point they may give directions to the contractual worker to make them great inside a sensible time. Further expressed that is really the contractual worker's duty to distinguish and amend abandons, not the client's, so if the customer brings deformities to the temporary worker's notification, they should clarify this is certifiably not an extensive rundown everything being equal .Toward the finish of the imperfections obligation period, the agreement executive readies a calendar of imperfections, posting those deformities that have not yet been corrected, and concurs with the contract based worker the date by which they will be redressed.

4.4 Questionnaire survey

The survey audit was one of three data arrangement gadgets used in this investigation. It was totally quantitative where the Likert scale was used generally. Overviews were scattered by hand similarly as electronic mail. The going with regions depicts the methodology in detail.

4.4.1 Objectives of Questionnaire Survey

The questionnaire survey overview was overwhelmingly used to recognize the most critical skills and competencies of Qs at each stage of property advancement and investigate the most huge abilities and skills of Qs in property development. In any case, it was additionally useful in positioning the discoveries of literature review and expert interview concerning objective three, four and five as distinguish the significance of the QS contribution at various stages of property development, recognize the most huge skills and competencies of Qs at each stage of property development and investigate the most critical skills and competencies of Qs in property development.

4.4.2 Design of the Questionnaire

The basis of questionnaire design was the literature review and expert questionnaire survey. The questionnaire were mainly two parts as Section “A” and Section “B” .Section “A” for general information of respondents and section “B” for study questions. The first question in questionnaires section “B” was aimed to identify the significance of the QS involvement at different stages of property development,

second question is to identify the most significant skills of QSs at each stage of property development and third question was aimed to identify the most significant competencies of QSs at each stage of property development.

4.4.3 Detail of questionnaire respondents

Since the review of this examination is directed to recognize the centrality of the QS involvement at various stages of property, distinguish the most noteworthy skills and competencies of QSs at each stage of property development and break down the most critical skills and competencies of QSs in property development. The surveys were conveyed distinctly among skillful QSs who are working in the property development with more than five (5) years' experience. Rate of respondents, respondents' organization types, working experience of respondents were the main topics which are used to describe the details of respondents that are described hereunder.

4.4.3.1 Rate of response

An all-out number of 77 surveys were circulated among expert QSs who are rehearsing property development in Sri Lanka. Be that as it may, 40 of them reacted to the survey inside the timeframe before the survey examination was begun. Subsequently, the reacting rate for the survey study was determined as 52%. The reaction rate and non-reaction rate are graphically introduced in Figure 4-1.

Rate of respondents

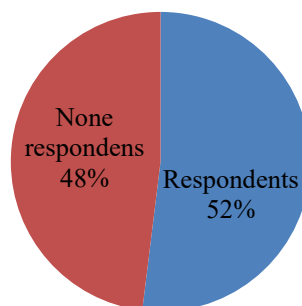


Figure 4-1: Rate of respondents-Pie chart

Table 4.6 shows the frequency and present of each type of category in the construction organization responded for the questionnaire.

Table 4-6- Response rate according to their type of respective organization

Types of organization	Distribution	Frequency	Percentage of collection
Client	11	7	63.63%
Contractor	31	12	38.70%
Consultant	35	21	60.0%
Total	77	40	57.14%

4.4.3.2 Respondents' organization types

From the total sample of respondents, 52.5% represented consultant organizations and 30% represented contracting organizations while only 17.5% represented organizations of clients. The percentages are further depicted in Figure 4-2 below. The rates are additionally delineated in Figure 4-2 underneath. The figure obviously presents that half of the respondents are from contracting organizations while other half is comprised with consultant organizations of clients

Respondents' organization types

■ Client ■ Contractor ■ Consultant

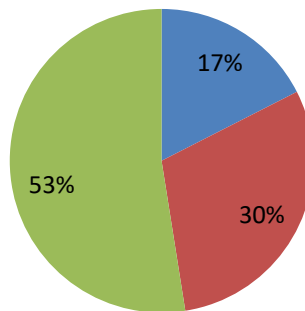


Figure 5-2: Respondents' organization types-Pie Chart

4.4.3.3. Working experience of respondents

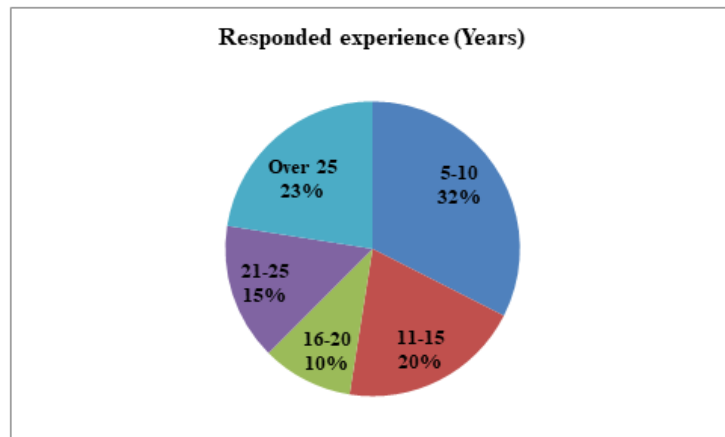


Figure 4-2: Participant Experience -Pie Chart

The Figure 4.3 shows the majority of respondents have (32%) 5-10 years' working experience in the construction industry, 23% of respondents have over 25 years of experience while 20% of them have 11-15 years of working experience in construction industry. 15% have 21-25 years of working experience where as 10% have 16-20 years of experience and it is the least amount. Since 68% of the respondents, who represented more than half of all respondents, are experienced more than 10 years that would help to establish the strength and relevancy of research outcome.

Table 4-7– Summary of responded working experience

Responded Experience (Years)	Frequency	Percentage
5-10	13	32.50%
11-15	8	20%
16-20	4	10%
21-25	6	15%
Over 25	9	22.50%
	40	100%

Table 4.7 shows the respondent's position among their organization and their working experience in the construction industry. Table 4.8 depicts the response experience percentage summary.

Table 4-8– Responded position and working experience

Designation	No of Respondents										Total	
	5-10yrs		11-15yrs		16-20yrs		21-25yrs		Over 25yrs			
	D	R	D	R	D	R	D	R	D	R	D	R
Managing Director	-	-	-	-	-	-	3	4	11	8	14	12
Director	-	-	-	-	5	2	7	2	6	1	18	5
Chief QS	9	7	8	6	9	2	-	-	-	-	26	15
QS	10	6	7	2	2	-	-	-	-	-	19	8
Total	19	13	15	8	16	4	10	6	17	9	77	40

D-Distributed, R-Returned.

4.4.4 Result of the Questionnaire survey

The questionnaires were examined by RII as labeled in the 3.4.3. Once brief the results of literature review and the results of questionnaire survey, it was understandable that the significance of each quantity surveying skill and competency differs against stages of property development in Sri Lanka. Hence, a Likert scale, where “1” indicated “**Not Significant at all**”, “2” indicated “**Not Significant**”, “3” indicated “**Significant**”, “4” indicated “**Highly Significant**” and “5” indicated “**Very Highly Significant**”. (Refer Section B in Appendix B) was used consequently.

The questionnaire analysis was done under following themes;

- Identify the significance of the QS involvement at different stages of property development
- Identify the most significant skills and competencies required by QSs to perform in **property development (new building construction)** at “**Concept stage**”.
- Identify the most significant skills and competencies required by QSs to perform in **property development (new building)** at “**Preliminary Market survey**” stage.
- Identify the most significant skills and competencies required by QSs to perform in **property development (new building)** at “**Development appraisal**” stage.

- Identify the most significant skills and competencies required by QSs to perform in **property development (new building)** at “**Cost benefit analysis**” stage.
- Identify the most significant skills and competencies required by QSs to perform in **property development (new building)** at “**Identification & acquisition of site**”stage.
- Identify the most significant skills and competencies required by QSs to perform in **property development (new building)** at “**Appointment of design and consultancy team**”stage.
- Identify the most significant skills and competencies required by QSs to perform in **property development (new building)** in “**Detail design of development**”.
- Identify the most significant skills and competencies required by QSs to perform in **property development (new building)** in “**Obtaining of approvals**”.
- Identify the most significant skills and competencies required by QSs to perform in **property development (new building)** at “**BOI rules and regulations**” stage.
- Identify the most significant skills and competencies required by QSs to perform in **property development (new building)** at “**Arrangement of finance**”stage .
- Identify the most significant skills and competencies required by QSs to perform in **property development (new building)** at “**Selection and appointment of a suitable contractor**”stage.
- Identify the most significant skills and competencies required by QSs to perform in **property development (new building)** at “**Construction**”stage.
- Identify the most significant skills and competencies required by QSs to perform in **property development (new building)** at “**Marketing, Selling & Completion**” stage.
- Identify the most significant skills and competencies required by QSs to perform in **property development (new building)** in “**Execution of property process**”.
- Identify the most significant skills and competencies required by QSs to perform in **property development (new building)** at“**Defects liability period**” stage.

- Identify the most significant skills and competencies (Top five ranks) required by QSs to perform in **each stage of property development (new building)**.
- Analyze the most significant skills and competencies (Top ten) required by QSs to perform in **property development**.

4.4.5 Significance of the QS involvement at different stages of property development

Calculated the overall RII value for involvement of QSs in each stage of property development in the Table 1 of Questionnaire (refer Section B – Table 1 of Appendix B). Table 4.9 depicted the significance of QS involvement at different stages of property development according to the overall RII values. According to the results in Table 4-9, the top five significance of QS involvement in property development are “Selection and appointment of a suitable contractor”, “Construction”, “Cost benefit analysis”, “Development appraisal”, “Concept stages”.

Table 4.9– Significance of the QS involvement at different stages of property development

Property development Stage	RII	Rank
Selection and appointment of a suitable contractor	0.926	1
Construction	0.900	2
Cost benefit analysis	0.850	3
Development appraisal	0.766	4
Concept	0.760	5
Preliminary market survey	0.746	6
Detail design of development	0.720	7
Defects liability period	0.706	8
Appointment of design and consultancy team	0.686	9
Arrangement of finance	0.680	10
BOI rules and regulations	0.646	11
Identification & acquisition of site	0.636	12
Execution of property process	0.586	13
Marketing , selling & completion	0.580	14
Obtaining of approvals	0.576	15

Based on these ranking results, 03 stages were highlighted as the involvement of quantity surveyor is highly significant in the property development sector with an RII high (H) ($0.8 \leq RII \leq 1$). Highest RII value recorded in the selection and appointment of a suitable contractor stage in a property development project with $RII=0.926$. Second, highest RII value highlighted in the construction stage with $RII=0.900$. Third highest RII value recorded in cost- benefit analysis stage with $RII=0.850$. Quantity surveyor involvement noted as highly medium (H-M) ($0.6 \leq RII \leq 0.8$) level in 09 stages of the property development project and medium category (M) ($0.4 \leq RII \leq 0.6$) highlighted 03 stages in the property development project. There was no stages below that region highlighted by the respondents that means all the stages of property development sector project quantity surveyor involvement is high, high medium and medium.

The graphical distribution of overall RII values for each stage of property development calculated and Significance of the QS involvement at different stages of property development is presented in Figure 4-4.

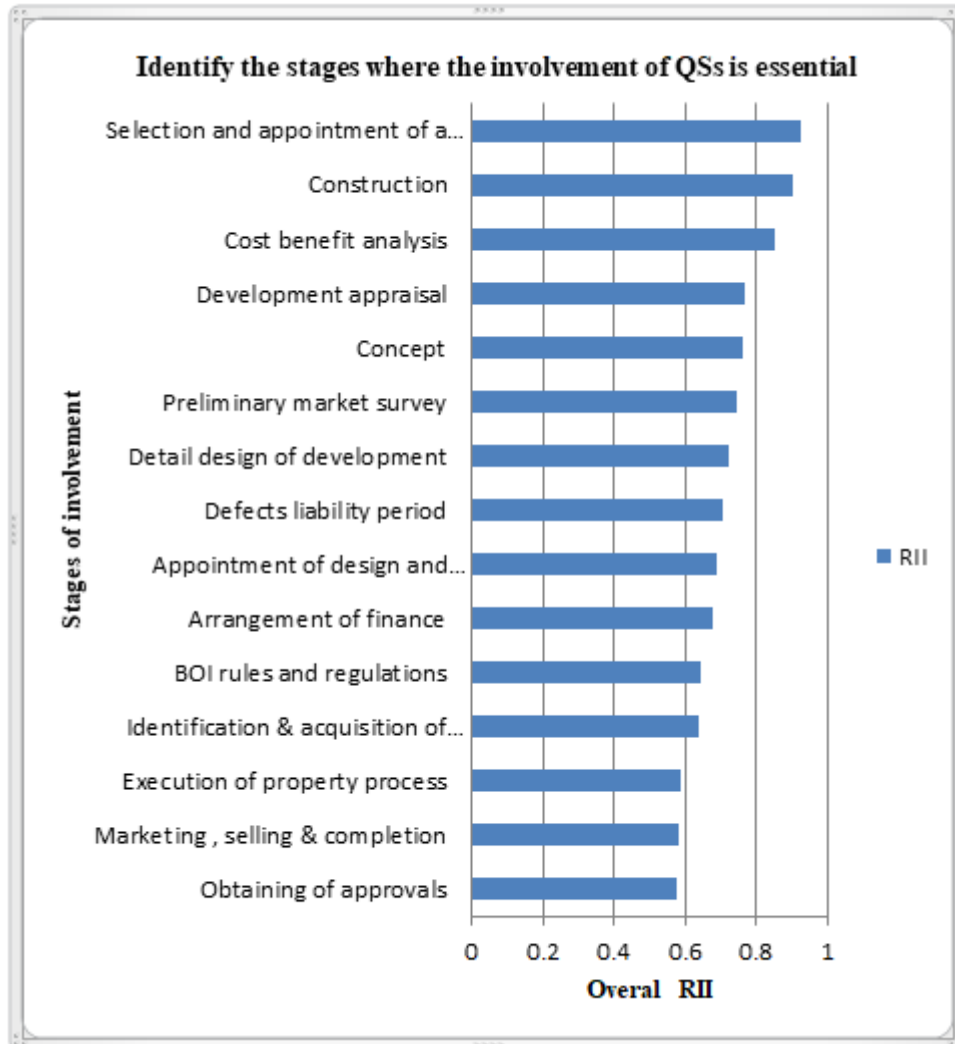


Figure 4-4: QS involvement at different stages of property development

4.4.6 The significance of skills and competencies of QS to perform property development

The contribution of each of the skills and competencies required by QS to perform in property development sector building project life cycle examined and the ranking by use of relative importance index (RII) which was computed using the equation described in chapter 3 and the results of each stage analysis presented in following.

4.4.6.1 The significance of skills and competencies of the QS to perform property development at “Concept stage”

Table 4.10 shows the results of the analysis from the respondent answer of skills and competencies for the concept stage in the property development sector. In this skill category out of thirty-six (36) factors, Seven (07) factors were recommended by the respondents to be highly essential with the RII value between 0.810 and 0.856.

Table 4-10: The significance of skills and competencies in concept stage.

Skills	RII	Rank	Competencies	RII	Rank
Cost responsibility	0.856	1	Cost estimating	0.906	1
Cost feasibility	0.850	2	Cost planning	0.886	2
Quantification	0.846	3	Budgetary process	0.880	3
Evaluation	0.830	4	Cost information database	0.850	4
Analysis	0.826	5	Quantification and measurement	0.836	5
Teamwork	0.826	5	Feasibility studies	0.810	6
Documentation	0.810	7	General procurement advice	0.800	7
Communication	0.790	8	Government regulation and law	0.786	8
Contractual knowledge (FIDIC/SBD)	0.790	8	Tendering process	0.780	9
Confidence	0.776	10	Life cycle cost analysis	0.780	9
Knowledge in economics	0.776	10	Professional practice	0.750	11
Problem solving	0.766	12	Construction technology	0.746	12
Critical thinking	0.760	13	Economic of construction	0.740	13
Presentation	0.750	14	Project value management	0.736	14
Leadership	0.746	15	Strategic planning	0.726	15
Negotiation	0.746	15	Tax depreciation	0.716	16
Self-management	0.740	17	Contract administration	0.716	16
Planning and organizing	0.740	17	Claims and dispute resolution	0.700	18
Management	0.730	19	Project management	0.700	18
Professional membership	0.730	19	Insurance	0.696	20
Efficiency	0.726	21	Project risk management	0.690	21
Industrial memory	0.726	21	BIM (Building Information Management)	0.686	22
Coordination	0.716	23	Property valuation	0.686	22
Conflict resolution	0.710	24	Construction chain management	0.680	24
Market condition	0.710	24	Personal and Interpersonal	0.680	24
Computer skills	0.700	26	Development appraisal	0.676	26
Lateral thinking across many fields	0.700	26	Expert witness / evidence	0.666	27
Knowledge in social behavior	0.696	28	Research and development	0.666	27

Skills	RII	Rank	Competencies	RII	Rank
Technology	0.690	29	Property investment funding.	0.666	27
Interpersonal	0.690	29	Special assessments	0.660	30
Flexibility	0.690	29	Computer services	0.656	31
Administrative	0.686	32	Account management	0.646	32
Legal familiarity	0.680	33	Resource analysis	0.646	32
Lifelong learning	0.670	34	Facilities management	0.646	32
Content strategy	0.670	34	Financial audit	0.636	35
Initiative and enterprises	0.600	36	Quality assurance	0.636	35
			Reporting structure (Material and cost)	0.636	35
			Technical due diligence	0.620	38
			Technical audits	0.616	39
			Community management	0.616	39
			Compliance issues	0.596	41
			Arbitration	0.590	42
			Business management	0.580	43
			COC Documentation (Certificate of Conformity)	0.570	44
			Handing over the project inventory.	0.556	45

As per the above Table 4.10 , 07 skill factors are highly essential to perform concept stage quantity surveyor roles such as cost responsibility, Cost feasibility, Quantification, Evaluation, Analysis, Teamwork, and Documentation. In this competency category out of forty-five (45) factors, Seven (07) factors were recommended by the respondents to be highly essential with the RII value between 0.800 and 0.906. These 07 competencies are highly essential to perform concept stage of the quantity surveyor roles such as cost estimating, Cost planning, Budgetary process, Cost information database, Quantification and measurement, Feasibility studies and General procurement advice.

4.4.6.2 The significance of skills and competencies of the QS to perform property development at “Preliminary market survey”

The results of the analysis from the respondent answer of skills and competencies for the preliminary market survey stage in the property development sector

presented in Table 4.11. In this skill category out of thirty-six (36) factors, All thirty-six (36) factors were recommended by the respondents to be highly medium essential with the RII value weight between 0.600 and 0.746.

Table 4-11: The significance of skills and competencies in Preliminary market survey stage.

Skills	RII	Rank	Competencies	RII	Rank
Evaluation	0.746	1	Budgetary process	0.746	1
Communication	0.740	2	Cost estimating	0.740	2
Documentation	0.740	2	Cost planning	0.726	3
Analysis	0.726	4	Cost information database	0.720	4
Confidence	0.716	5	Professional practice	0.710	5
Teamwork	0.710	6	Project management	0.706	6
Problem solving	0.710	6	Strategic planning	0.696	7
Presentation	0.710	6	Life cycle cost analysis	0.690	8
Cost responsibility	0.710	6	Feasibility studies	0.686	9
Quantification	0.706	10	Project value management	0.686	9
Knowledge in economics	0.700	11	Project risk management	0.686	9
Management	0.696	12	Economic of construction	0.686	9
Self-management	0.696	12	Quantification and measurement	0.670	13
Market condition	0.696	12	Government regulation and law	0.670	13
Planning and organizing	0.690	15	Tax depreciation	0.670	13
Cost feasibility	0.686	16	General procurement advice	0.650	16
Negotiation	0.680	17	Development appraisal	0.646	17
Coordination	0.680	17	Tendering process	0.640	18
Efficiency	0.680	17	Personal and Interpersonal	0.640	18
Computer skills	0.676	20	Technical due diligence	0.636	20
Lifelong learning	0.666	21	Property investment funding.	0.630	21
Conflict resolution	0.666	21	Computer services	0.626	22
Administrative	0.666	21	Technical audits	0.626	22
Knowledge in social behavior	0.666	21	Quality assurance	0.626	22
Critical thinking	0.660	25	Contract administration	0.626	22
Lateral thinking across many fields	0.660	25	Insurance	0.626	22
Contractual knowledge (FIDIC/SBD)	0.660	25	Account management	0.616	27
Content strategy	0.656	28	Community management	0.616	27

Skills	RII	Rank	Competencies	RII	Rank
Industrial memory	0.656	28	Research and development	0.610	29
Technology	0.650	30	Construction chain management	0.606	30
Leadership	0.646	31	Claims and dispute resolution	0.606	30
Legal familiarity	0.646	31	Resource analysis	0.606	30
Flexibility	0.646	31	Construction technology	0.606	30
Professional membership	0.646	31	Business management	0.600	34
Initiative and enterprises	0.640	35	Special assessments	0.600	34
Interpersonal	0.626	36	Compliance issues	0.600	34
			Expert witness / evidence	0.596	37
			BIM (Building Information Management)	0.596	37
			Property valuation	0.590	39
			Financial audit	0.586	40
			Facilities management	0.586	41
			Reporting structure (Material and cost)	0.586	41
			Arbitration	0.576	43
			COC Documentation (Certificate of Conformity)	0.530	44
			Handing over the project inventory.	0.486	45

As per the above Table 4.11, the first rank of skill category identified as evaluation skill (RII=0.746) to perform a preliminary market survey stage quantity surveyor role. In this competencies category out of forty-five (45) factors, Thirty-four (34) factors were recommended by the respondents to be highly medium essential with the RII value between 0.600 and 0.746. These 34 competencies are highly-medium essential to perform a preliminary market survey stage of the quantity surveyor role.

4.4.6.3 The significance of skills and competencies of the QS to perform property development at “Development appraisal”

Table 4.12 indicates the results of the analysis from the respondent answer of skills and competencies for the development appraisal stage in the property development. In this skill category out of thirty-six (36) factors, Six (06) factors were identified by the respondents to be highly essential with the RII value between 0.800 and 0.846.

Table 4-12: The significance of skills and competencies in Development appraisal stage.

Skills	RII	Rank	Competencies	RII	Rank
Evaluation	0.846	1	Cost estimating	0.866	1
Documentation	0.830	2	Cost planning	0.866	1
Analysis	0.826	3	Budgetary process	0.846	3
Problem solving	0.820	4	Professional practice	0.800	4
Quantification	0.806	5	Strategic planning	0.790	5
Communication	0.800	6	General procurement advice	0.786	6
Cost feasibility	0.790	7	Development appraisal	0.780	7
Cost responsibility	0.780	8	Life cycle cost analysis	0.776	8
Technology	0.776	9	Quantification and measurement	0.770	9
Critical thinking	0.776	9	Cost information database	0.770	9
Coordination	0.776	9	Feasibility studies	0.770	9
Teamwork	0.770	12	Construction technology	0.756	12
Confidence	0.770	12	Project value management	0.756	12
Planning and organizing	0.766	14	Project management	0.756	12
Efficiency	0.766	14	Government regulation and law	0.750	15
Industrial memory	0.766	14	Economic of construction	0.750	15
Management	0.760	17	Tendering process	0.746	17
Self-management	0.760	17	Property investment funding.	0.740	18
Leadership	0.760	17	Project risk management	0.736	19
Presentation	0.756	20	Personal and Interpersonal	0.730	20
Content strategy	0.756	20	Contract administration	0.720	21
Contractual knowledge (FIDIC/SBD)	0.756	20	Property valuation	0.716	22
Lifelong learning	0.750	23	Claims and dispute resolution	0.710	23
Negotiation	0.750	23	Facilities management	0.706	24
Legal familiarity	0.750	23	BIM (Building Information Management)	0.706	24
Flexibility	0.746	26	Construction chain management	0.700	26
Computer skills	0.740	27	Resource analysis	0.700	26
Knowledge in economics	0.740	27	Computer services	0.700	26
Market condition	0.726	29	Insurance	0.700	26
Initiative and enterprises	0.716	30	Quality assurance	0.690	30
Professional membership	0.710	31	Tax depreciation	0.666	31
Conflict resolution	0.700	32	Special assessments	0.666	31
Lateral thinking across many fields	0.700	32	Compliance issues	0.660	33
Administrative	0.696	34	Community management	0.660	33
Knowledge in social	0.696	34	Expert witness / evidence	0.656	35

Skills	RII	Rank	Competencies	RII	Rank
behavior					
Interpersonal	0.670	36	Research and development	0.656	35
			Account management	0.650	37
			Financial audit	0.646	38
			Reporting structure (Material and cost)	0.646	38
			Business management	0.640	40
			Technical due diligence	0.630	41
			Technical audits	0.600	42
			COC Documentation (Certificate of Conformity)	0.596	43
			Handing over the project inventory.	0.586	44
			Arbitration	0.570	45

As per the above Table 4.12, 06 skill factors are highly essential to perform the development appraisal stage quantity surveyor role such as evaluation, Documentation, Analysis, Problem-solving, Quantification, and Communication. In this competencies category out of forty-five (45) factors, Four (04) factors were recommended by the respondents to be highly essential with the RII value between 0.800 and 0.866. These 04 competencies are highly essential to perform the development appraisal stage of the quantity surveyor role such as cost estimating, Cost planning, Budgetary process, and Professional Practice.

4.4.6.4 The significance of skills and competencies of QS to perform property development at “Cost benefit analysis”

Table 4.13 shows the results of the analysis from the respondent answer of skills and competencies for the Cost-benefit analysis stage in the property development sector. In this skill category out of thirty-six (36) factors, eight (08) factors were recommended by the respondents to be highly essential with the RII value between 0.800 and 0.880.

Table 4-13: The significance of skills and competencies in Cost benefit analysis stage

Skills	RII	Rank	Competencies	RII	Rank
Analysis	0.880	1	Cost planning	0.790	1
Evaluation	0.866	2	Quantification and measurement	0.790	1
Documentation	0.860	3	Cost estimating	0.786	3
Quantification	0.820	4	Cost information database	0.776	4
Communication	0.816	5	Budgetary process	0.760	5
Teamwork	0.810	6	Life cycle cost analysis	0.760	5
Cost responsibility	0.806	7	Economic of construction	0.760	5
Administrative	0.800	8	Strategic planning	0.750	8
Problem solving	0.796	9	Feasibility studies	0.746	9
Leadership	0.780	10	Property investment funding.	0.746	9
Critical thinking	0.780	10	Development appraisal	0.740	11
Presentation	0.780	10	Project value management	0.736	12
Cost feasibility	0.780	10	Project risk management	0.730	13
Knowledge in economics	0.780	10	Special assessments	0.720	14
Technology	0.770	15	Construction technology	0.710	15
Confidence	0.770	15	Tax depreciation	0.710	15
Computer skills	0.770	15	Compliance issues	0.710	15
Efficiency	0.770	15	Professional practice	0.700	18
Management	0.766	19	Property valuation	0.700	18
Coordination	0.760	20	General procurement advice	0.696	20
Industrial memory	0.756	21	Resource analysis	0.696	20
Lifelong learning	0.750	22	Computer services	0.696	20
Self-management	0.746	23	Research and development	0.696	20
Market condition	0.740	24	Project management	0.696	20
Legal familiarity	0.736	25	Financial audit	0.686	25
Initiative and enterprises	0.730	26	Business management	0.686	25
Conflict resolution	0.730	26	Account management	0.680	27
Planning and organizing	0.726	26	Facilities management	0.680	27
Content strategy	0.726	26	Expert witness / evidence	0.676	29
Flexibility	0.726	26	Construction chain management	0.670	30
Lateral thinking across many fields	0.726	26	Quality assurance	0.670	30
Negotiation	0.720	32	Contract administration	0.670	30
Interpersonal	0.710	33	Insurance	0.670	30

Skills	RII	Rank	Competencies	RII	Rank
Contractual knowledge (FIDIC/SBD)	0.700	34	Personal and Interpersonal	0.666	34
Professional membership	0.696	35	Tendering process	0.656	35
Knowledge in social behavior	0.690	36	Technical audits	0.656	35
			Reporting structure (Material and cost)	0.656	35
			Government regulation and law	0.640	38
			Claims and dispute resolution	0.630	39
			Technical due diligence	0.630	39
			BIM (Building Information Management)	0.630	39
			Community management	0.630	39
			Handing over the project inventory.	0.620	43
			COC Documentation (Certificate of Conformity)	0.620	43
			Arbitration	0.610	45

These 08 skill factors are highly essential to perform Cost-benefit analysis stage quantity surveyor role such as Analysis, Evaluation, Documentation, Quantification, Communication, Teamwork, Cost responsibility and Administrative. In this competency category out of forty-five (45) factors, All forty-five (45) factors were recommended by the respondents to be highly medium essential with the RII value between 0.600 and 0.790. These 45 competencies are highly medium essential to perform the Cost-benefit analysis stage of the quantity surveyor role.

4.4.6.5 The significance of skills and competencies of the QS to perform property development at “Identification & acquisition of site”

Table 4.14 depicts the results of the analysis from the respondent answer of skills and competencies for Identification & acquisition of a site in the property development sector. In this skill category out of thirty-six (36) factors, Thirty-five (35) factors were recommended by the respondents to be highly medium essential with the RII value weight between 0.600 and 0.766.

Table 4-14 : The Significance of skills and competencies in Identification & acquisition of site stage.

Skills	RII	Rank	Competencies	RII	Rank
Analysis	0.766	1	Government regulation and law	0.766	1
Communication	0.740	2	Professional practice	0.716	2
Evaluation	0.736	3	Strategic planning	0.710	3
Presentation	0.730	4	Cost planning	0.710	3
Cost responsibility	0.720	5	Budgetary process	0.706	5
Negotiation	0.710	6	Insurance	0.706	5
Legal familiarity	0.710	6	Project risk management	0.700	7
Confidence	0.706	8	Community management	0.700	7
Efficiency	0.706	8	Cost estimating	0.690	9
Teamwork	0.700	10	Feasibility studies	0.690	9
Cost feasibility	0.700	10	Cost information database	0.686	11
Management	0.696	12	Property valuation	0.686	11
Industrial memory	0.696	12	Property investment funding.	0.680	13
Documentation	0.690	14	Development appraisal	0.680	13
Leadership	0.690	14	Personal and Interpersonal	0.680	13
Flexibility	0.690	14	General procurement advice	0.676	16
Problem solving	0.686	17	Economic of construction	0.670	17
Quantification	0.680	18	Resource analysis	0.656	18
Conflict resolution	0.680	18	Project management	0.656	18
Content strategy	0.680	18	Life cycle cost analysis	0.650	20
Planning and organizing	0.670	21	Contract administration	0.650	20
Coordination	0.670	21	Special assessments	0.646	22
Self-management	0.666	23	Computer services	0.640	23
Lateral thinking across many fields	0.666	23	Expert witness / evidence	0.636	24
Knowledge in economics	0.666	23	Project value management	0.630	25
Lifelong learning	0.660	26	Compliance issues	0.626	26
Critical thinking	0.660	26	Quantification and measurement	0.620	27
Administrative	0.660	26	Tendering process	0.620	27
Contractual knowledge (FIDIC/SBD)	0.660	26	Facilities management	0.620	27
Interpersonal	0.656	30	Research and development	0.616	30
Computer skills	0.656	30	Construction technology	0.610	31
Technology	0.650	32	Business management	0.610	31
Initiative and enterprises	0.650	32	Financial audit	0.606	33
Market condition	0.650	32	Tax depreciation	0.600	34

Skills	RII	Rank	Competencies	RII	Rank
Knowledge in social behaviour	0.646	35	Quality assurance	0.600	34
Professional membership	0.576	36	Construction chain management	0.596	36
			Account management	0.586	37
			Arbitration	0.586	37
			Claims and dispute resolution	0.580	39
			Technical due diligence	0.580	39
			Reporting structure (Material and cost)	0.580	39
			BIM (Building Information Management)	0.570	42
			COC Documentation (Certificate of Conformity)	0.570	42
			Technical audits	0.556	44
			Handing over the project inventory.	0.550	45

As per the above Table 4-14, the first rank of skill category identified as Analysis skill (RII=0.766) to Identification & acquisition of site stage quantity surveyor role. In this competencies category out of forty-five (45) factors, Thirty-four (34) factors were recommended by the respondents to be highly medium essential with the RII value between 0.600 and 0.766. These 34 competencies are highly-medium essential to perform Identification & acquisition of site stage of the quantity surveyor role.

4.4.6.6 The significance of skills and competencies of the QS to perform property development at “Appointment of design and consultancy team”

Table 4.15 presents the results of the analysis from the respondent answers of skills and competencies for the appointment of the design and consultancy team in the property development sector. In this skill category out of thirty-six (36) factors, All thirty-six (36) factors were recommended by the respondents to be highly medium essential with the RII value weight between 0.600 and 0.756.

Table 4-15: The Significance of skills and competencies in appointment of design and consultancy team stage

Skills	RII	Rank	Competencies	RII	Rank
Communication	0.756	1	General procurement advice	0.736	1
Documentation	0.756	1	Budgetary process	0.710	2
Industrial memory	0.746	3	Strategic planning	0.706	3
Management	0.740	4	Professional practice	0.706	3
Efficiency	0.726	5	Contract administration	0.700	5
Contractual knowledge (FIDIC/SBD)	0.726	5	Insurance	0.700	5
Evaluation	0.720	7	Cost estimating	0.696	7
Teamwork	0.720	7	Cost planning	0.690	8
Confidence	0.720	7	Tendering process	0.690	8
Coordination	0.720	7	Project risk management	0.676	10
Planning and organizing	0.716	11	Personal and Interpersonal	0.676	10
Analysis	0.710	12	Feasibility studies	0.670	12
Negotiation	0.706	13	Government regulation and law	0.666	13
Quantification	0.700	14	Development appraisal	0.660	14
Problem solving	0.700	14	Quantification and measurement	0.650	15
Flexibility	0.700	14	Technical due diligence	0.650	15
Computer skills	0.696	17	Economic of construction	0.650	15
Content strategy	0.696	17	Construction technology	0.640	18
Self-management	0.690	19	Quality assurance	0.640	18
Presentation	0.690	19	Project management	0.636	20
Cost responsibility	0.690	19	Resource analysis	0.630	21
Leadership	0.686	22	Account management	0.626	22
Administrative	0.686	22	Special assessments	0.626	22
Cost feasibility	0.686	22	Community management	0.626	22
Interpersonal	0.676	25	Construction chain management	0.620	25
Legal familiarity	0.676	25	Computer services	0.620	25
Professional membership	0.676	25	Facilities management	0.620	25
Lateral thinking across many fields	0.676	25	Cost information database	0.610	28
Knowledge in economics	0.670	29	Compliance issues	0.610	28
Critical thinking	0.666	30	Expert witness / evidence	0.600	30
Conflict resolution	0.666	30	Project value management	0.600	30
Market condition	0.660	32	Life cycle cost analysis	0.596	32
Technology	0.640	33	Technical audits	0.596	32

Skills	RII	Rank	Competencies	RII	Rank
Knowledge in social behaviour	0.640	33	Property investment funding.	0.596	32
Lifelong learning	0.636	35	Tax depreciation	0.590	35
Initiative and enterprises	0.610	36	Claims and dispute resolution	0.586	36
			Research and development	0.586	36
			Business management	0.580	38
			BIM (Building Information Management)	0.570	39
			Financial audit	0.560	40
			Property valuation	0.560	40
			Arbitration	0.550	42
			COC Documentation (Certificate of Conformity)	0.536	43
			Reporting structure (Material and cost)	0.536	43
			Handing over the project inventory.	0.516	45

As per the above Table 4-15, the first rank of skill category identified as communication skill (RII=0.756) to the appointment of design and consultancy team stage quantity surveyor role. In this competency category out of forty-five (45) factors, Thirty (30) factors were recommended by the respondents to be highly medium essential with the RII value between 0.700 and 0.736. These 30 competencies are highly-medium essential to perform appointment of design and consultancy team stage of the quantity surveyor role.

4.4.6.7 The significance of skills and competencies of the QS to perform property development at “Detail design of development”

Table 4.16 shows the results of the analysis from the respondent answer of skills and competencies for Detail design of the development stage in the property development sector. In this skill category out of thirty-six (36) factors, Ten (10) factors were recommended by the respondents to be highly essential with the RII value between 0.806 and 0.856.

Table 4-16: The significance of skills and competencies in Detail design of development stage.

Skills	RII	Rank	Competencies	RII	Rank
Quantification	0.856	1	Cost estimating	0.870	1
Documentation	0.840	2	Cost planning	0.860	2
Teamwork	0.830	3	Budgetary process	0.830	3
Contractual knowledge (FIDIC/SBD)	0.826	4	Quantification and measurement	0.826	4
Analysis	0.820	5	Tendering process	0.800	5
Communication	0.820	5	General procurement advice	0.780	6
Evaluation	0.816	7	Strategic planning	0.766	7
Problem solving	0.816	7	Construction technology	0.760	8
Efficiency	0.806	9	Government regulation and law	0.760	8
Industrial memory	0.806	9	Cost information database	0.760	8
Self-management	0.796	11	Professional practice	0.760	8
Computer skills	0.786	12	Project value management	0.756	12
Coordination	0.780	13	Life cycle cost analysis	0.750	13
Cost responsibility	0.780	13	Contract administration	0.750	13
Management	0.776	15	BIM (Building Information Management)	0.750	13
Planning and organizing	0.776	15	Feasibility studies	0.740	16
Technology	0.776	15	Project risk management	0.730	17
Confidence	0.776	15	Economic of construction	0.730	17
Flexibility	0.770	16	Personal and Interpersonal	0.730	17
Legal familiarity	0.766	17	Project management	0.720	20
Negotiation	0.760	18	Resource analysis	0.716	21
Critical thinking	0.756	19	Insurance	0.716	21
Presentation	0.756	19	Technical due diligence	0.710	23
Leadership	0.750	23	Quality assurance	0.710	23
Professional membership	0.750	23	Development appraisal	0.710	23
Lateral thinking across many fields	0.750	23	Construction chain management	0.700	26
Cost feasibility	0.750	23	Computer services	0.700	26
Conflict resolution	0.740	28	Facilities management	0.696	28
Lifelong learning	0.736	29	Community management	0.696	28
Administrative	0.736	29	Claims and dispute resolution	0.690	30
Content strategy	0.736	29	Compliance issues	0.686	31
Interpersonal	0.726	32	Research and development	0.676	32
Initiative and enterprises	0.720	33	Property investment funding.	0.670	33

Skills	RII	Rank	Competencies	RII	Rank
Knowledge in economics	0.716	34	Expert witness / evidence	0.666	34
Market condition	0.700	35	Property valuation	0.666	34
Knowledge in social behaviour	0.630	36	Account management	0.656	36
			Special assessments	0.650	37
			Technical audits	0.650	37
			Business management	0.646	39
			Tax depreciation	0.646	39
			Financial audit	0.630	41
			Reporting structure (Material and cost)	0.630	41
			Arbitration	0.606	43
			Handing over the project inventory.	0.586	44
			COC Documentation (Certificate of Conformity)	0.586	44

These 10 skill factors are highly essential to perform Detail design of the development stage quantity surveyor role such as Quantification, Documentation, Teamwork, Contractual knowledge, Analysis, Communication, Evaluation, Problem-solving, Efficiency, and industrial memory. In this competencies category out of forty-five (45) factors, Five (05) factors were recommended by the respondents to be highly essential with the RII value between 0.800 and 0.870. These 05 competencies are highly essential to perform Detail design of development stage quantity surveyor role such as cost estimating, Cost planning, Budgetary process, Quantification and measurement and Tendering process.

4.4.6.8 The significance of skills and competencies of the QS to perform property development at “Obtaining of approvals”

Table 4.17 presents the results of the analysis from the respondent answer of skills and competencies for obtaining approvals stage in the property development sector. In this skill category out of thirty-six (36) factors, All thirty-six (36) factors were recommended by the respondents to be highly medium essential with the RII value weight between 0.600 and 0.786.

Table 4-1: The significance of skills and competencies in Obtaining of approvals stage.

Skills	RII	Rank	Competencies	RII	Rank
Documentation	0.786	1	Government regulation and law	0.780	1
Communication	0.770	2	Professional practice	0.706	2
Coordination	0.760	3	Strategic planning	0.696	3
Management	0.746	4	Budgetary process	0.680	4
Presentation	0.740	5	Compliance issues	0.670	5
Teamwork	0.726	6	Personal and Interpersonal	0.666	6
Problem solving	0.720	7	Project management	0.656	7
Negotiation	0.716	8	Contract administration	0.656	7
Legal familiarity	0.716	8	Project risk management	0.650	9
Flexibility	0.710	10	Community management	0.650	9
Planning and organizing	0.706	11	Expert witness / evidence	0.640	10
Administrative	0.700	12	Insurance	0.640	10
Industrial memory	0.700	12	COC Documentation (Certificate of Conformity)	0.640	10
Computer skills	0.696	14	Business management	0.636	14
Confidence	0.690	15	Cost information database	0.636	14
Professional membership	0.690	15	Cost estimating	0.630	16
Self-management	0.686	17	Tendering process	0.630	16
Efficiency	0.680	18	Research and development	0.630	16
Lateral thinking across many fields	0.676	19	Project value management	0.630	16
Quantification	0.670	20	Quality assurance	0.626	20
Lifelong learning	0.666	21	Economic of construction	0.626	20
Interpersonal	0.660	22	Property valuation	0.620	22
Contractual knowledge (FIDIC/SBD)	0.660	22	Special assessments	0.616	23
Market condition	0.660	22	Cost planning	0.610	24
Cost feasibility	0.656	25	General procurement advice	0.610	24
Analysis	0.650	26	Quantification and measurement	0.610	24
Evaluation	0.646	27	Resource analysis	0.610	24
Conflict resolution	0.646	27	Feasibility studies	0.610	24
Content strategy	0.646	27	Property investment funding.	0.610	24
Cost responsibility	0.640	30	Computer services	0.606	30
Technology	0.636	31	Construction technology	0.606	30
Leadership	0.636	31	Reporting structure (Material and cost)	0.600	32
Critical thinking	0.636	31	Facilities management	0.596	33
Knowledge in social behaviour	0.636	31	Life cycle cost analysis	0.590	34
Knowledge in economics	0.620	35	Tax depreciation	0.586	35
Initiative and enterprises	0.616	36	Development appraisal	0.586	35

Skills	RII	Rank	Competencies	RII	Rank
			Construction chain management	0.580	37
			BIM (Building Information Management)	0.580	37
			Technical due diligence	0.566	39
			Financial audit	0.560	40
			Technical audits	0.550	41
			Claims and dispute resolution	0.546	42
			Arbitration	0.536	43
			Handing over the project inventory.	0.536	43
			Account management	0.530	45

As per the above Table 4-17, the first rank of skill category identified as documentation skill (RII=0.786) to obtaining of approvals stage quantity surveyor role. In this competencies category out of forty-five (45) factors, Thirty-two (32) factors were recommended by the respondents to be highly medium essential with the RII value between 0.600 and 0.780. These 32 competencies are highly-medium essential to perform Obtaining of approvals stage of the quantity surveyor role.

4.4.6.9 The significance of skills and competencies of the QS to perform property development at “BOI rules and regulations”

Table 4.18 presents the outcomes of the investigation from the respondent answer of skills and competencies for BOI rules and regulations stage in the property development sector. In this skill category out of thirty-six (36) factors, Two (02) factors were recommended by the respondents to be highly essential with the RII value weight between 0.800 and 0.810.

Table 4-18: The significance skills and competencies in BOI rules and regulations stage.

Skills	RII	Rank	Competencies	RII	Rank
Documentation	0.786	1	Feasibility studies	0.736	1
Communication	0.770	2	Government regulation and law	0.720	2
Legal familiarity	0.760	3	Professional practice	0.706	3
Flexibility	0.746	4	Strategic planning	0.700	4
Administrative	0.736	5	Cost planning	0.690	5

Skills	RII	Rank	Competencies	RII	Rank
Coordination	0.736	5	Budgetary process	0.686	6
Efficiency	0.726	7	Cost estimating	0.680	7
Industrial memory	0.726	7	Quantification and measurement	0.680	7
Quantification	0.720	9	General procurement advice	0.676	9
Computer skills	0.720	9	Tax depreciation	0.676	9
Presentation	0.716	11	Financial audit	0.670	11
Management	0.710	12	Computer services	0.670	11
Problem solving	0.710	12	Life cycle cost analysis	0.670	11
Confidence	0.710	12	Economic of construction	0.670	11
Teamwork	0.706	15	Personal and Interpersonal	0.670	11
Professional membership	0.706	15	Cost information database	0.666	16
Evaluation	0.696	17	Construction technology	0.656	17
Negotiation	0.696	17	Resource analysis	0.646	18
Leadership	0.690	19	Special assessments	0.646	18
Cost responsibility	0.690	19	Compliance issues	0.646	18
Analysis	0.686	21	Project value management	0.646	18
Content strategy	0.686	21	Community management	0.636	22
Lateral thinking across many fields	0.686	21	Reporting structure (Material and cost)	0.636	22
Critical thinking	0.680	24	Project risk management	0.620	24
Market condition	0.680	24	Tendering process	0.610	25
Self-management	0.676	26	Project management	0.610	25
Planning and organizing	0.676	26	Research and development	0.606	27
Interpersonal	0.676	26	Technical audits	0.606	27
Cost feasibility	0.670	29	Quality assurance	0.600	29
Knowledge in economics	0.670	29	Facilities management	0.600	29
Lifelong learning	0.656	31	Technical due diligence	0.596	31
Contractual knowledge (FIDIC/SBD)	0.656	31	Insurance	0.596	31
Technology	0.646	33	Account management	0.590	33
Conflict resolution	0.646	33	Contract administration	0.590	33
Knowledge in social behaviour	0.636	35	Business management	0.586	35
Initiative and enterprises	0.610	36	Property investment funding.	0.586	35
			Development appraisal	0.586	35
			BIM (Building Information Management)	0.580	38
			Construction chain management	0.576	39

Skills	RII	Rank	Competencies	RII	Rank
			Property valuation	0.576	39
			Handing over the project inventory.	0.556	41
			COC Documentation (Certificate of Conformity)	0.550	42
			Claims and dispute resolution	0.536	43
			Expert witness / evidence	0.536	43
			Arbitration	0.500	45

The first rank of skill category identified as documentation skill (RII=0.786) essential to BOI rules and regulations stage quantity surveyor role. In this competency category out of forty-five (45) factors, Thirty (30) factors were recommended by the respondents to be highly medium essential with the RII value between 0.600 and 0.736. These 30 competencies are highly-medium essential to perform BOI rules and regulations stage of the quantity surveyor role.

4.4.6.10 The significance of skills and competencies of the QS to perform property development at “Arrangement of finance”

Table 4.19 presents the outcomes of the study from the respondent answer of skills and competencies for the Arrangement of the finance stage in the property development sector. In this skill category out of thirty-six (36) factors, thirty-six (36) factors were recommended by the respondents to be highly medium essential with the RII value weight between 0.600 and 0.756.

Table 4-2: The significance skills and competencies in Arrangement of finance stage

Skills	RII	Rank	Competencies	RII	Rank
Analysis	0.756	1	Budgetary process	0.790	1
Evaluation	0.756	1	Cost planning	0.780	2
Documentation	0.750	3	Cost estimating	0.766	3
Problem solving	0.746	4	Project risk management	0.730	4
Communication	0.740	5	Strategic planning	0.726	5
Management	0.740	5	Economic of construction	0.726	5
Quantification	0.740	5	Government regulation and law	0.720	7

Skills	RII	Rank	Competencies	RII	Rank
Planning and organizing	0.740	5	Cost information database	0.720	7
Negotiation	0.740	5	General procurement advice	0.706	9
Cost responsibility	0.740	5	Project value management	0.706	9
Efficiency	0.736	11	Development appraisal	0.700	11
Coordination	0.730	12	Tendering process	0.696	12
Legal familiarity	0.730	12	Property investment funding.	0.696	12
Knowledge in economics	0.730	12	Financial audit	0.690	14
Teamwork	0.720	15	Life cycle cost analysis	0.690	14
Flexibility	0.720	15	Project management	0.690	14
Cost feasibility	0.720	15	Insurance	0.690	14
Self-management	0.710	18	Tax depreciation	0.686	18
Administrative	0.710	18	Feasibility studies	0.680	19
Market condition	0.710	18	Contract administration	0.680	19
Critical thinking	0.700	21	Account management	0.676	21
Industrial memory	0.700	22	Professional practice	0.676	21
Knowledge in social behaviour	0.696	23	Resource analysis	0.670	23
Leadership	0.686	24	Quantification and measurement	0.666	24
Confidence	0.686	24	Computer services	0.666	24
Professional membership	0.686	24	Special assessments	0.660	26
Contractual knowledge (FIDIC/SBD)	0.686	24	Compliance issues	0.650	27
Computer skills	0.680	28	Construction chain management	0.646	28
Conflict resolution	0.676	29	Personal and Interpersonal	0.646	28
Interpersonal	0.676	29	Property valuation	0.646	28
Content strategy	0.676	29	Technical audits	0.640	31
Presentation	0.670	32	Quality assurance	0.640	31
Lifelong learning	0.660	33	Facilities management	0.630	33
Lateral thinking across many fields	0.660	33	Business management	0.626	34
Initiative and enterprises	0.646	35	Construction technology	0.616	35
Technology	0.636	36	Technical due diligence	0.616	35
			Research and development	0.610	37
			Community management	0.610	37
			Claims and dispute resolution	0.606	39
			Expert witness / evidence	0.580	40
			Reporting structure (Material and cost)	0.550	41

Skills	RII	Rank	Competencies	RII	Rank
			Arbitration	0.536	42
			BIM (Building Information Management)	0.526	43
			Handing over the project inventory.	0.520	44
			COC Documentation (Certificate of Conformity)	0.490	45

As per the above Table 4-19, In this competencies category out of forty-five (45) factors, Thirty-nine (39) factors were recommended by the respondents to be highly medium essential with the RII value between 0.600 and 0.790. These 39 competencies are highly-medium essential to perform the Arrangement of finance stage of the quantity surveyor role.

4.4.6.11 The significance of skills and competencies of the QS to perform property development at “Selection and appointment of a suitable contractor”

Table 4.20 shows the results of the analysis from the respondent answer of skills and competencies for the Selection and appointment of a suitable contractor stage in the property development sector. In this skill category out of thirty-six (36) factors, seventeen (17) factors were recommended by the respondents to be highly essential with the RII value between 0.800 and 0.896.

Table 4-20: The significance of skills and competencies in Selection and appointment of a suitable contractor stage.

Skills	RII	Rank	Competencies	RII	Rank
Evaluation	0.896	1	Tendering process	0.846	1
Analysis	0.880	2	General procurement advice	0.840	2
Communication	0.870	3	Quantification and measurement	0.780	3
Documentation	0.870	3	Budgetary process	0.776	4
Negotiation	0.870	3	Cost information database	0.776	4
Contractual knowledge (FIDIC/SBD)	0.860	6	Cost planning	0.770	5
Management	0.840	7	Government regulation and law	0.760	6
Teamwork	0.836	8	Strategic planning	0.756	7

Skills	RII	Rank	Competencies	RII	Rank
Critical thinking	0.830	9	Contract administration	0.756	7
Quantification	0.820	10	Insurance	0.756	7
Confidence	0.820	10	Cost estimating	0.750	11
Problem solving	0.810	12	Resource analysis	0.750	11
Planning and organizing	0.806	13	Professional practice	0.750	11
Coordination	0.806	13	Construction chain management	0.746	14
Conflict resolution	0.800	15	Construction technology	0.740	14
Administrative	0.800	15	Claims and dispute resolution	0.730	16
Industrial memory	0.800	15	Computer services	0.730	16
Efficiency	0.790	18	Project value management	0.730	16
Computer skills	0.786	19	Economic of construction	0.730	16
Professional membership	0.786	19	Project risk management	0.726	20
Flexibility	0.780	21	Feasibility studies	0.720	21
Self-management	0.776	22	Project management	0.720	21
Leadership	0.776	22	Personal and Interpersonal	0.720	21
Cost feasibility	0.776	22	Compliance issues	0.710	24
Cost responsibility	0.760	25	Quality assurance	0.706	25
Market condition	0.760	25	Property investment funding.	0.706	25
Legal familiarity	0.756	27	Development appraisal	0.706	25
Knowledge in economics	0.756	27	Technical audits	0.690	28
Technology	0.750	29	Financial audit	0.686	29
Lifelong learning	0.750	29	Account management	0.680	30
Knowledge in social behaviour	0.750	29	Technical due diligence	0.680	30
Interpersonal	0.746	32	Life cycle cost analysis	0.670	32
Presentation	0.746	32	Special assessments	0.670	32
Lateral thinking across many fields	0.746	32	Facilities management	0.670	32
Content strategy	0.726	35	Community management	0.670	32
Initiative and enterprises	0.700	36	Business management	0.660	36
			Research and development	0.660	36
			BIM (Building Information Management)	0.656	38
			Expert witness / evidence	0.650	39
			Reporting structure (Material and cost)	0.650	39
			Property valuation	0.630	41
			Tax depreciation	0.626	42

Skills	RII	Rank	Competencies	RII	Rank
			COC Documentation (Certificate of Conformity)	0.626	42
			Handing over the project inventory.	0.616	44
			Arbitration	0.600	45

These 17 skill factors are highly essential to perform selection and appointment of a suitable contractor stage quantity surveyor role. The research revealed that evaluation skills having the highest RII value (0.896) and a higher number of top essential skills required to perform this stage. In this competencies category out of forty-five (45) factors, Two (02) factors were recommended by the respondents to be highly essential with the RII value between 0.840 and 0.846. These 02 competencies are highly essential to perform Selection and appointment of a suitable contractor stage of the quantity surveyor role such as tendering process and general procurement advice

4.4.6.12 The significance of skills and competencies of the QS to perform property development at “Construction”

The results of the analysis from the respondent answer of skills and competencies for the construction stage in the property development sector is presented in Table 4.21. In this skill category out of thirty-six (36) factors, twenty-three (23) factors were recommended by the respondents to be highly essential with the RII value between 0.800 and 0.876.

Table 4-21: The significance skills and competencies in Construction stage

Skills	RII	Rank	Competencies	RII	Rank
Communication	0.876	1	Cost planning	0.870	1
Contractual knowledge (FIDIC/SBD)	0.876	1	Cost estimating	0.846	2
Quantification	0.866	3	Quantification and measurement	0.846	2
Negotiation	0.856	4	Contract administration	0.830	3
Evaluation	0.850	5	Strategic planning	0.820	4
Teamwork	0.850	5	Budgetary process	0.820	4
Documentation	0.846	7	Professional practice	0.816	7

Skills	RII	Rank	Competencies	RII	Rank
Problem solving	0.846	7	Resource analysis	0.810	8
Analysis	0.836	9	Cost information database	0.810	8
Leadership	0.836	9	General procurement advice	0.806	10
Conflict resolution	0.836	9	Project management	0.806	10
Management	0.830	12	Construction technology	0.796	12
Cost responsibility	0.826	13	Government regulation and law	0.796	12
Self-management	0.820	14	Project value management	0.796	12
Efficiency	0.820	14	Project risk management	0.796	12
Legal familiarity	0.820	14	Reporting structure (Material and cost)	0.796	12
Critical thinking	0.816	17	Claims and dispute resolution	0.790	17
Confidence	0.816	17	Quality assurance	0.786	18
Planning and organizing	0.810	19	Computer services	0.780	19
Coordination	0.810	19	Economic of construction	0.766	20
Administrative	0.806	21	Insurance	0.760	21
Cost feasibility	0.806	21	Personal and Interpersonal	0.750	22
Lateral thinking across many fields	0.800	23	Construction chain management	0.746	23
Lifelong learning	0.796	24	Arbitration	0.740	24
Interpersonal	0.796	24	Development appraisal	0.740	24
Computer skills	0.796	24	Expert witness / evidence	0.736	26
Technology	0.790	27	Business management	0.736	26
Presentation	0.790	27	Community management	0.736	26
Content strategy	0.786	29	Account management	0.730	28
Initiative and enterprises	0.770	30	Compliance issues	0.730	28
Flexibility	0.756	31	COC Documentation (Certificate of Conformity)	0.730	28
Professional membership	0.756	31	Tendering process	0.726	32
Industrial memory	0.750	33	Financial audit	0.726	32
Knowledge in economics	0.740	34	Technical due diligence	0.726	32
Market condition	0.736	35	Research and development	0.716	35
Knowledge in social behavior	0.706	36	BIM (Building Information Management)	0.716	35
			Property valuation	0.716	35
			Life cycle cost analysis	0.710	38
			Facilities management	0.710	38
			Handing over the project inventory.	0.710	38

Skills	RII	Rank	Competencies	RII	Rank
			Technical audits	0.696	41
			Property investment funding.	0.686	42
			Special assessments	0.680	43
			Tax depreciation	0.666	44
			Feasibility studies	0.650	45

These 23 skill factors are highly essential to perform the construction stage quantity surveyor role. The research revealed that communication skills having the highest RII value (0.876) and a higher number of highly essential skills required to perform this stage. In this competencies category out of forty-five (45) factors, Eleven (11) factors were recommended by the respondents to be highly essential with the RII value between 0.806 and 0.870. These 11 competencies are highly essential to perform the construction stage of the quantity surveyor role.

4.4.6.13 The significance of skills and competencies of the QS to perform property development at “Marketing, selling & completion”

Table 4.22 presents the outcomes of the investigation from the respondent answer of skills and competencies for the Marketing, selling & completion stage in the property development sector. In this skill category out of thirty-six (36) factors, Two (02) factors were recommended by the respondents to be highly essential with the RII value weight between 0.800 and 0.810.

Table 4-22: The significance of skills and competencies in Marketing, selling & completion stage

Skills	RII	Rank	Competencies	RII	Rank
Documentation	0.810	1	Strategic planning	0.740	1
Communication	0.800	2	Budgetary process	0.740	1
Teamwork	0.776	3	Government regulation and law	0.736	3
Analysis	0.770	4	Computer services	0.720	4
Negotiation	0.756	5	Cost planning	0.710	5
Evaluation	0.750	6	COC Documentation (Certificate of Conformity)	0.696	6
Management	0.750	6	Reporting structure (Material and cost)	0.686	7

Skills	RII	Rank	Competencies	RII	Rank
Computer skills	0.750	6	Cost information database	0.680	8
Coordination	0.750	6	Cost estimating	0.670	9
Presentation	0.746	10	Research and development	0.666	10
Market condition	0.746	10	Special assessments	0.666	10
Administrative	0.740	12	Economic of construction	0.666	10
Quantification	0.736	13	Project value management	0.660	13
Problem solving	0.736	13	Compliance issues	0.656	14
Leadership	0.736	13	Professional practice	0.656	14
Efficiency	0.736	13	Project risk management	0.650	16
Flexibility	0.730	17	Handing over the project inventory.	0.650	16
Industrial memory	0.730	17	Construction technology	0.646	18
Knowledge in economics	0.720	19	Financial audit	0.640	19
Knowledge in social behaviour	0.720	19	Quality assurance	0.640	19
Critical thinking	0.716	21	Resource analysis	0.636	21
Lateral thinking across many fields	0.716	21	Life cycle cost analysis	0.636	21
Confidence	0.706	23	Property investment funding.	0.636	22
Legal familiarity	0.706	23	Personal and Interpersonal	0.636	22
Planning and organizing	0.700	25	Account management	0.630	25
Technology	0.700	25	Business management	0.630	25
Interpersonal	0.700	25	Technical audits	0.630	25
Lifelong learning	0.690	28	Development appraisal	0.630	25
Self-management	0.686	29	Quantification and measurement	0.626	29
Conflict resolution	0.686	29	Expert witness / evidence	0.626	29
Initiative and enterprises	0.680	31	Contract administration	0.626	29
Professional membership	0.670	32	Technical due diligence	0.620	32
Cost responsibility	0.660	33	Project management	0.620	32
Content strategy	0.656	34	Insurance	0.620	32
Cost feasibility	0.636	35	Community management	0.620	32
Contractual knowledge (FIDIC/SBD)	0.616	36	Tendering process	0.610	36
			Construction chain management	0.606	37
			Property valuation	0.606	37
			Arbitration	0.600	39
			Tax depreciation	0.600	39
			General procurement advice	0.596	41

Skills	RII	Rank	Competencies	RII	Rank
			Claims and dispute resolution	0.596	41
			Facilities management	0.596	41
			Feasibility studies	0.590	44
			BIM (Building Information Management)	0.560	45

The first rank of skill category is identified as documentation skill (RII=0.810) and second rank skill is identified as communication (RII=0.800) to Marketing, selling & completion stage of the quantity surveyor role. In this competencies category out of forty-five (45) factors, Forty (40) factors were recommended by the respondents to be highly medium essential with the RII value between 0.600 and 0.740. These 40 competencies are highly-medium essential to perform Marketing, selling & completion stage quantity surveyor role.

4.4.6.14 The significance of skills and competencies of the QS to perform property development at “Execution of property process”

The outcomes of the investigation from the respondents answer of skills and competencies for the Execution of the property process stage in the property development sector is presented in Table 4.23. In this skill category out of thirty-six (36) factors, a thirty-six (36) factors were recommended by the respondents to be highly medium essential with the RII value between 0.600 and 0.770.

Table 4-23: The significance of skills and competencies in Execution of property process stage

Skills	RII	Rank	Competencies	RII	Rank
Documentation	0.770	1	Strategic planning	0.730	1
Communication	0.766	2	Budgetary process	0.730	1
Teamwork	0.740	3	Government regulation and law	0.710	3
Administrative	0.736	4	Cost planning	0.700	4
Confidence	0.736	4	Special assessments	0.696	5
Coordination	0.736	4	Research and development	0.690	6
Management	0.720	7	Life cycle cost analysis	0.690	6

Skills	RII	Rank	Competencies	RII	Rank
Leadership	0.720	7	Computer services	0.680	8
Negotiation	0.716	9	Feasibility studies	0.676	9
Legal familiarity	0.716	9	Economic of construction	0.676	9
Evaluation	0.710	11	Cost estimating	0.670	11
Planning and organizing	0.710	11	Tax depreciation	0.670	11
Computer skills	0.710	11	Property valuation	0.670	11
Analysis	0.706	14	Cost information database	0.666	14
Problem solving	0.706	14	Community management	0.656	15
Flexibility	0.706	14	Account management	0.650	16
Presentation	0.700	17	Property investment funding.	0.646	17
Critical thinking	0.696	18	Personal and Interpersonal	0.646	17
Self-management	0.690	19	Professional practice	0.646	17
Efficiency	0.686	20	Financial audit	0.640	20
Initiative and enterprises	0.680	21	Resource analysis	0.640	20
Industrial memory	0.680	21	General procurement advice	0.636	22
Market condition	0.680	21	Project risk management	0.636	22
Quantification	0.676	24	Business management	0.630	24
Technology	0.676	24	Project value management	0.626	25
Lifelong learning	0.676	24	Project management	0.626	25
Conflict resolution	0.676	24	Facilities management	0.626	25
Interpersonal	0.676	24	Development appraisal	0.620	28
Knowledge in economics	0.676	24	Quantification and measurement	0.616	29
Lateral thinking across many fields	0.656	30	Technical audits	0.610	30
Cost responsibility	0.650	31	Compliance issues	0.610	30
Content strategy	0.646	32	Insurance	0.610	30
Knowledge in social behaviour	0.640	33	Tendering process	0.606	33
Contractual knowledge (FIDIC/SBD)	0.630	34	Quality assurance	0.606	33
Cost feasibility	0.626	35	Technical due diligence	0.600	35
Professional membership	0.620	36	Contract administration	0.600	35
			Construction technology	0.596	37
			Reporting structure (Material and cost)	0.596	37
			COC Documentation (Certificate of Conformity)	0.580	39
			Claims and dispute resolution	0.570	40

Skills	RII	Rank	Competencies	RII	Rank
			Expert witness / evidence	0.570	40
			Construction chain management	0.566	42
			Handing over the project inventory.	0.556	43
			BIM (Building Information Management)	0.526	44
			Arbitration	0.506	45

These 36 skill factors are highly essential to perform the Execution of the property process stage of the quantity surveyor role. The research revealed that documentation skills having the highest RII value (0.770). In this competency group out of forty-five (45) factors, Thirty-six (36) factors were recommended by the respondents to be highly medium essential with the RII value between 0.600 and 0.730. These 36 competencies are highly medium essential to perform Execution of property process stage quantity surveyor role.

4.4.6.15 The significance of skills and competencies of the Quantity surveyor to perform property development at “Defects liability period”

The outcomes of the investigation from the respondents answer of skills and competencies for the Defects liability period stage in the property development sector are presented in Table 4.24. In this skill category out of thirty-six (36) factors, thirty-five (35) factors were recommended by the respondents to be highly medium essential with the RII value weight between 0.600 and 0.770.

Table 4-24: The significance of skills and competencies in Defects liability period stage.

Skills	RII	Rank	Competencies	RII	Rank
Contractual knowledge (FIDIC/SBD)	0.770	1	Contract administration	0.726	1
Communication	0.740	2	Insurance	0.716	2
Administrative	0.740	2	Quantification and measurement	0.700	3
Conflict resolution	0.736	4	Government regulation and law	0.696	4
Problem solving	0.726	5	Handing over the project inventory.	0.690	5

Skills	RII	Rank	Competencies	RII	Rank
Efficiency	0.720	6	Financial audit	0.686	6
Legal familiarity	0.716	7	Construction technology	0.686	6
Documentation	0.710	8	Arbitration	0.680	8
Self-management	0.710	8	Claims and dispute resolution	0.676	9
Technology	0.706	10	Professional practice	0.676	9
Management	0.696	11	Computer services	0.666	11
Negotiation	0.696	11	Cost information database	0.666	11
Quantification	0.690	13	COC Documentation (Certificate of Conformity)	0.666	11
Leadership	0.690	13	Technical due diligence	0.660	14
Critical thinking	0.690	13	Quality assurance	0.660	14
Coordination	0.690	13	Technical audits	0.656	16
Analysis	0.686	17	Budgetary process	0.650	17
Teamwork	0.686	17	Life cycle cost analysis	0.650	17
Lateral thinking across many fields	0.686	17	Community management	0.650	17
Evaluation	0.680	20	Cost estimating	0.646	20
Cost responsibility	0.680	20	Facilities management	0.646	20
Lifelong learning	0.676	22	Resource analysis	0.640	22
Flexibility	0.670	23	Expert witness / evidence	0.640	22
Planning and organizing	0.666	24	Personal and Interpersonal	0.640	22
Presentation	0.666	24	Cost planning	0.636	25
Industrial memory	0.666	24	Compliance issues	0.630	26
Cost feasibility	0.666	24	Strategic planning	0.626	27
Interpersonal	0.660	28	Project value management	0.626	27
Computer skills	0.660	28	Project management	0.626	27
Initiative and enterprises	0.650	30	Reporting structure (Material and cost)	0.626	27
Confidence	0.646	31	Project risk management	0.610	31
Content strategy	0.630	32	Account management	0.606	32
Knowledge in social behaviour	0.620	33	Research and development	0.606	32
Knowledge in economics	0.610	34	Feasibility studies	0.600	34
Professional membership	0.606	35	Tax depreciation	0.600	34
Market condition	0.550	36	Special assessments	0.600	34
			Economic of construction	0.600	34
			Construction chain management	0.580	38
			General procurement advice	0.576	39

Skills	RII	Rank	Competencies	RII	Rank
			BIM (Building Information Management)	0.566	40
			Business management	0.556	41
			Property investment funding.	0.556	41
			Property valuation	0.556	41
			Tendering process	0.550	44
			Development appraisal	0.550	44

The first rank of skill category identified as Contractual knowledge (RII=0.770) is essential to perform the Defects liability period stage of a quantity surveyor role. In this competency category out of forty-five (45) factors, Thirty-seven (37) factors were recommended by the respondents to be highly medium essential with the RII value between 0.600 and 0.726. These 37 competencies are highly-medium essential to perform Defects liability period stage of a quantity surveyor roles such as contract administration (RII=0.726), Insurance (RII=0.716) and Quantification and measurement (RII=0.700), etc

4.4.7 The highly significance of skills and competencies of the QS to perform different stages in property development.

Table 4.25 indicated top-ranked skills and competencies essential to perform the Quantity surveyor role in different stages in the property development sector from concept stage to defect liability stage by using relative importance index. Using the RII, the rank orders of skill and competency factors were obtained from all responses. The high ranking factors out of thirty-six (36) skill factors and forty-five (45) competency factors (Top 5 in Table 4.25) are observed in fifteen stages in the property development project discussed below.

Table 4-3: Top Skills and Competencies required in each stages of property development project.

Stage No	Description	Skills	RII	Rank	Competencies	RII	Rank
1	Concept	Cost responsibility	0.856	1	Cost estimating	0.906	1
		Cost feasibility	0.850	2	Cost planning	0.886	2
		Quantification	0.846	3	Budgetary process	0.880	3
		Evaluation	0.830	4	Cost information database	0.850	4
		Analysis	0.826	5	Quantification and measurement	0.836	5
2	Preliminary market survey	Evaluation	0.746	1	Budgetary process	0.746	1
		Communication	0.740	2	Cost estimating	0.740	2
		Documentation	0.740	2	Cost planning	0.726	3
		Analysis	0.726	4	Cost information database	0.720	4
		Confidence	0.716	5	Professional practice	0.710	5
3	Development appraisal	Evaluation	0.846	1	Cost estimating	0.866	1
		Documentation	0.830	2	Cost planning	0.866	1
		Analysis	0.826	3	Budgetary process	0.846	3
		Problem solving	0.820	4	Professional practice	0.800	4
		Quantification	0.806	5	Strategic planning	0.790	5
4	Cost benefit analysis	Analysis	0.880	1	Cost planning	0.790	1
		Evaluation	0.866	2	Quantification and measurement	0.790	1
		Documentation	0.860	3	Cost estimating	0.786	3

Stage No	Description	Skills	RII	Rank	Competencies	RII	Rank
		Quantification	0.820	4	Cost information database	0.776	4
		Communication	0.816	5	Budgetary process	0.760	5
5	Identification & acquisition of site	Analysis	0.766	1	Government regulation and law	0.766	1
		Communication	0.740	2	Professional practice	0.716	2
		Evaluation	0.736	3	Strategic planning	0.710	3
		Presentation	0.730	4	Cost planning	0.710	3
		Cost responsibility	0.720	5	Budgetary process	0.706	5
6	Appointment of design and consultancy team	Communication	0.756	1	General procurement advice	0.736	1
		Documentation	0.756	1	Budgetary process	0.710	2
		Industrial memory	0.746	3	Strategic planning	0.706	3
		Management	0.740	4	Professional practice	0.706	3
		Efficiency	0.726	5	Contract administration	0.700	5
7	Detail design of development	Quantification	0.856	1	Cost estimating	0.870	1
		Documentation	0.840	2	Cost planning	0.860	2
		Teamwork	0.830	3	Budgetary process	0.830	3
		Contractual knowledge (FIDIC/SBD)	0.826	4	Quantification and measurement	0.826	4
		Analysis	0.820	5	Tendering process	0.800	5
8	Obtaining of approvals	Documentation	0.786	1	Government regulation and law	0.780	1
		Communication	0.770	2	Professional practice	0.706	2

Stage No	Description	Skills	RII	Rank	Competencies	RII	Rank
		Coordination	0.760	3	Strategic planning	0.696	3
		Management	0.746	4	Budgetary process	0.680	4
		Presentation	0.740	5	Compliance issues	0.670	5
9	BOI rules and regulations	Documentation	0.786	1	Feasibility studies	0.736	1
		Communication	0.770	2	Government regulation and law	0.720	2
		Legal familiarity	0.760	3	Professional practice	0.706	3
		Flexibility	0.746	4	Strategic planning	0.700	4
		Administrative	0.736	5	Cost planning	0.690	5
10	Arrangement of finance	Analysis	0.756	1	Budgetary process	0.790	1
		Evaluation	0.756	1	Cost planning	0.780	2
		Documentation	0.750	3	Cost estimating	0.766	3
		Problem solving	0.746	4	Project risk management	0.730	4
		Communication	0.740	5	Strategic planning	0.726	5
11	Selection and appointment of a suitable contractor	Evaluation	0.896	1	Tendering process	0.846	1
		Analysis	0.880	2	General procurement advice	0.840	2
		Communication	0.870	3	Quantification and measurement	0.780	3
		Documentation	0.870	3	Budgetary process	0.776	4
		Negotiation	0.870	3	Cost information database	0.776	4
12	Construction	Communication	0.876	1	Cost planning	0.870	1

Stage No	Description	Skills	RII	Rank	Competencies	RII	Rank
		Contractual knowledge (FIDIC/SBD)	0.876	1	Cost estimating	0.846	2
		Quantification	0.866	3	Quantification and measurement	0.846	2
		Negotiation	0.856	4	Contract administration	0.830	3
		Evaluation	0.850	5	Strategic planning	0.820	4
13	Marketing , selling & completion	Documentation	0.810	1	Strategic planning	0.740	1
		Communication	0.800	2	Budgetary process	0.740	1
		Teamwork	0.776	3	Government regulation and law	0.736	3
		Analysis	0.770	4	Computer services	0.720	4
		Negotiation	0.756	5	Cost planning	0.710	5
14	Execution of property process	Documentation	0.770	1	Strategic planning	0.730	1
		Communication	0.766	2	Budgetary process	0.730	1
		Teamwork	0.740	3	Government regulation and law	0.710	3
		Administrative	0.736	4	Cost planning	0.700	4
		Confidence	0.736	4	Special assessments	0.696	5
15	Defects liability period	Contractual knowledge (FIDIC/SBD)	0.770	1	Contract administration	0.726	1
		Communication	0.740	2	Insurance	0.716	2
		Administrative	0.740	2	Quantification and measurement	0.700	3
		Conflict resolution	0.736	4	Government regulation and law	0.696	4
		Problem solving	0.726	5	Handing over the project inventory.	0.690	5

The most significant five (05) skill factors in concept stage having high (H) ($0.8 \leq RII \leq 1$) RII value for cost responsibility with $RII= 0.856$, Cost feasibility with $RII= 0.850$, Quantification with $RII= 0.846$, Evaluation with $RII= 0.830$, Analysis with $RII= 0.826$. The most significant five (05) competency factors in concept stage having high (H) ($0.8 \leq RII \leq 1$) RII value for cost estimating with $RII= 0.906$, Cost planning with $RII= 0.886$, Budgetary process with $RII= 0.880$, Cost information database with $RII= 0.850$, Quantification and measurement with $RII= 0.836$. The most significant five (05) skill factors in preliminary market survey stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$) rating, RII value for Evaluation with $RII= 0.746$, Communication with $RII= 0.740$, Documentation with $RII= 0.740$, Analysis with $RII= 0.726$, Confidence with $RII= 0.716$. The most significant five (05) competency factors in preliminary market survey stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$), RII value for Budgetary process with $RII= 0.746$, Cost planning with $RII= 0.740$, Cost planning with $RII= 0.726$, Cost information database with $RII= 0.720$, Professional practice with $RII= 0.710$.

The most significant five (05) skill factors in development appraisal stage having high (H) ($0.8 \leq RII \leq 1$) RII value for evaluation with $RII= 0.846$, Documentation with $RII= 0.830$, Analysis with $RII= 0.826$, Problem-solving with $RII= 0.820$, Quantification with $RII= 0.806$. The most significant four (04) competency factors in development appraisal stage having high (H) ($0.8 \leq RII \leq 1$) RII value for cost estimating with $RII= 0.866$, Cost planning with $RII= 0.866$, Budgetary process with $RII= 0.846$, Professional practice with $RII= 0.800$, Fifth ranking competency factor having High-medium (H-M) ($0.6 \leq RII \leq 0.8$) value for strategic planning with $RII= 0.790$. The most significant five (05) skill factors in identification & acquisition of site stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$) rating, RII value for analysis with $RII= 0.766$, Communication with $RII= 0.740$, Evaluation with $RII= 0.736$, Presentation with $RII= 0.730$, Cost responsibility with $RII= 0.720$. The most significant five (05) competency factors in identification & acquisition of site stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$), RII value for Government regulation and law with $RII= 0.766$, Professional practice with $RII= 0.716$, Strategic planning with $RII= 0.710$, Cost planning with $RII= 0.710$, Budgetary process with $RII=$

0.706. The most significant five (05) skill factors in appointment of design and consultancy team stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$) rating, RII value for communication with RII= 0.756, Documentation with RII= 0.756, Industrial memory with RII= 0.746, Management with RII= 0.740, Efficiency with RII= 0.726. The most significant five (05) competency factors in appointment of design and consultancy team stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$), RII value for general procurement advice with RII= 0.736, Budgetary process with RII= 0.710, Strategic planning with RII= 0.706, Professional practice with RII= 0.706, Contract administration with RII= 0.700. The most significant five (05) skill factors in detail design of development stage having high (H) ($0.8 \leq RII \leq 1$) RII value for quantification with RII= 0.856, Documentation with RII= 0.840, Teamwork with RII= 0.830, Contractual knowledge (FIDIC/ SBD) with RII= 0.826, Analysis with RII= 0.820. The most significant five (05) competency factors in detail design of development stage having high (H) ($0.8 \leq RII \leq 1$) RII value for cost estimating with RII= 0.870, Cost planning with RII= 0.860, Budgetary process with RII= 0.830, Quantification and measurement with RII= 0.826, Tendering process with RII= 0.800.

The most significant five (05) skill factors in obtaining of approvals stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$) rating, RII value for documentation with RII= 0.786, Communication with RII= 0.770, Coordination with RII = 0.760, Management with RII= 0.746, Presentation with RII= 0.740. The most significant five (05) competency factors in obtaining of approvals stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$), RII value for government regulation and law with RII= 0.780, Professional practice with RII= 0.706, Strategic planning with RII= 0.696, Budgetary process with RII= 0.680, Compliance issues with RII= 0.670. The most significant five (05) skill factors in an arrangement of finance stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$) rating, RII value for analysis with RII= 0.756, Evaluation with RII= 0.756, Documentation with RII= 0.750, Problem-solving with RII= 0.746, Communication with RII= 0.740. The most significant five (05) competency factors in arrangement of finance stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$), RII value for Budgetary process with RII= 0.790, Cost planning with RII=

0.780, Cost estimating with RII= 0.766, Project risk management with RII= 0.730, Strategic planning with RII= 0.726. The most significant five (05) skill factors in selection and appointment of a suitable contractor stage having high (H) ($0.8 \leq RII \leq 1$) RII value for evaluation with RII= 0.896, Analysis with RII= 0.880, Communication with RII= 0.870, Documentation with RII= 0.870, Negotiation skill factor with RII= 0.826. The most significant three (03) competency factors in selection and appointment of a suitable contractor stage having high (H) ($0.8 \leq RII \leq 1$) RII value for tendering process with RII= 0.846, General procurement advice with RII= 0.840, Remaining top two factors having High-medium (H-M) ($0.6 \leq RII \leq 0.8$), Quantification and measurement with RII= 0.780, Budgetary process with RII= 0.776, Cost information database with RII= 0.776.

The most significant five (05) skill factors in construction stage having high (H) ($0.8 \leq RII \leq 1$) RII value for communication with RII= 0.876, Contractual knowledge (FIDIC/SBD) with RII= 0.876, Quantification with RII= 0.866, Negotiation with RII= 0.856, Evaluation factor with RII= 0.850. The most significant five (05) competency factors in construction stage having high (H) ($0.8 \leq RII \leq 1$) RII value for cost planning with RII= 0.870, Cost estimating with RII= 0.846, Quantification and measurement with RII= 0.846, Contract administration with RII= 0.830, Strategic planning with RII= 0.820. The most significant five (02) skill factors in Marketing/selling & completion stage having high (H) ($0.8 \leq RII \leq 1$) RII value for documentation with RII= 0.810, Communication with RII= 0.800, Remaining top three factors having High-medium (H-M) ($0.6 \leq RII \leq 0.8$), Teamwork with RII= 0.776, Analysis with RII= 0.770, Negotiation factor with RII= 0.756. The most significant five (05) competency factors in Marketing/selling & completion stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$), RII value for strategic planning with RII= 0.740, Budgetary process with RII= 0.740, Government regulation and law with RII= 0.736, Computer service with RII= 0.720, Cost planning with RII= 0.710. The most significant five (05) skill factors in execution of property process stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$) rating, RII value for documentation with RII= 0.770, Communication with RII= 0.766, Teamwork with RII=

0.740, Administrative with RII= 0.736, Confidence with RII= 0.736. The most significant five (05) competency factors in execution of property process stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$), RII value for strategic planning with RII= 0.730, Budgetary process with RII= 0.730, Government regulation and law with RII= 0.710, Cost planning with RII= 0.700, Special assessments with RII= 0.696. The most significant five (05) skill factors in cost- benefit analysis stage having high (H) ($0.8 \leq RII \leq 1$) RII value for analysis with RII= 0.880, Evaluation with RII= 0.866, Documentation with RII= 0.860, Quantification with RII= 0.820, Communication factor with RII= 0.816. The most significant five (05) competency factors in construction stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$), RII value for cost planning with RII= 0.790, Quantification and measurement with RII= 0.790, Cost estimating with RII= 0.786, Cost information database with RII= 0.776, Budgetary process with RII= 0.760.

The most significant five (05) skill factors in BOI rules and regulations stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$) rating, RII value for documentation with RII= 0.786, Communication with RII= 0.770, Legal familiarity with RII= 0.760, Flexibility with RII= 0.746, Administrative with RII= 0.736. The most significant five (05) competency factors in BOI rules and regulations stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$), RII value for Feasibility studies with RII= 0.736, Government regulation and law with RII= 0.720, Professional practice with RII= 0.706, Strategic planning with RII= 0.700, Cost planning with RII= 0.690. The most significant five (05) skill factors in defects liability period stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$) rating, RII value for contractual knowledge (FIDIC/SBD) with RII= 0.770, Communication with RII= 0.740, Administrative with RII= 0.740, Conflict resolution with RII= 0.736, Problem solving with RII= 0.726. The most significant five (05) competency factors in defects liability period stage having High-medium (H-M) ($0.6 \leq RII \leq 0.8$), RII value for contract administration with RII= 0.726, Insurance with RII= 0.716, Quantification and measurement with RII= 0.700, Government regulations and law with RII= 0.696, Handing over the project inventory with RII= 0.690.

4.4.8 The highly significance skills and competencies of QS to perform property development.

4.4.8.1 The highly significance skills of QS to perform property development.

Table 4-26 shows overall skills ranking which gathered facts and data by conducting a questioner survey on stages of property development. Survey identified top Ten (10) skills sets out of Thirty Six (36) skills using overall RII value and each skill set as given stages of property development and given scores accordingly. Table 5-4: Overall Skills ranking in each stage of property development.

Table 4-26: Significant Skills required in each stages of property development project

Skill	Overall RII	Rank	Rank of each stage of property development														
			a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
Documentation	0.790	1	7	2	2	14	1	2	1	3	3	7	1	1	3	1	8
Communication	0.786	2	8	2	6	2	1	5	2	5	3	1	2	2	5	2	2
Evaluation	0.770	3	4	1	1	3	7	7	27	1	1	5	6	11	2	17	20
Analysis	0.768	4	5	4	3	1	12	5	26	1	2	9	4	14	1	21	17
Teamwork	0.760	5	5	6	12	10	7	3	6	15	8	5	3	3	6	15	17
Quantification	0.755	6	3	10	5	18	14	1	20	5	10	3	13	24	4	9	13
Problem solving	0.753	7	12	6	4	17	14	7	7	4	12	7	13	14	9	12	5
Management	0.746	8	19	12	17	12	4	15	4	5	7	12	6	7	19	12	11
Coordination	0.741	9	23	17	9	21	7	13	3	12	13	19	6	4	20	5	13
Negotiation	0.741	10	15	17	23	6	13	18	8	5	3	4	5	9	32	17	11

a- Concept, b- Preliminary Market survey, c- Development appraisal, d- Identification & acquisition of site, e- Appointment of design and consultancy team, f-Detail design of development, g-Obtaining of approvals, h-Arrangement of finance, i-Selection and appointment of a suitable contractor, j- Construction, k-Marketing selling & completion, l-Execution of property process, m-Cost benefit analysis, n-BOI rules & regulations,0-Defect liability period.

'Documentation' skill gets the highest overall RII which is 0.790 and rank "1". The further same skill is top rankings (rank "1") in appointment of design and consultancy team, Obtaining of approval, Marketing selling and completion, Execution of property process and Cost-benefit analysis stages of property development. Further Identification & acquisition of site stage and Concept stage slightly lower rank which is 14. "Communication "skill gets an overall RII of 0.786 and gets rank two(2) in the table along with high ranks for stages like Appointment of design and consultancy team and Construction. Further "Communication" skill gets significantly higher ranks in stages compared to all other skills.” Evaluation" skill gets an overall RII of 0.770 and gets rank Three (3) in the table along with top rankings in Preliminary Market survey, Development Appraisal, Arrangement of finance, Selection and appointment of a suitable contractor stages. "Analysis "skill gets an overall RII of 0.768 and gets rank Four (4) in the table along with high ranks for stages like Identification & acquisition of site, Arrangement of finance and Cost benefit analysis. “Teamwork "skill gets an overall RII of 0.760 and gets rank Five (5) in the table .Quantification and problem-solving ranks Six (6) and Seven (7) in overall RII respectively and shares rank Fourteen (14) in Appointment of design and consultancy team stage. “Management” and “Coordination” ranks Eight(8) and Nine (9) in overall RII respectively and has significant lower rankings at stages when compared to other skill sets Negotiation ranks Ten (10) in the table which gets rank Thirty-two (32) for Cost-benefit analysis stage which is the highest when compared to all other stage rankings.

4.4.8.2 The highly significance competencies of QS to perform property development

Table 4-27 shows overall competencies ranking which gathered facts and data by conducting a questioner survey on stages of property development. Survey identified top Ten (10) competencies out of Forty-Five (45) using overall RII value. Each competency has given stages of development and given scores accordingly. "Budgetary process" gets an overall RII of 0.757 and gets top rank in the table along with high ranks for stages like Preliminary market survey, Arrangement of finance, Marketing selling and completion, Execution of property process. "Cost Planning" gets an overall RII of 0.753 and gets

overall rank two (2) in the table and it is get top ranks for stages like Development appraisal, Construction and Cost benefit analysis. Further “Cost Planning” gets significant low ranks in Obtaining of approvals stage and Defect liability period stage and share an equal rank with Cost estimation in stage of Development appraisal. “Cost Estimating” gets an overall RII of 0.747 and gets overall rank Three (3) in the table and it is get top ranks for stages like Concept, Development appraisal and Detail design of development.

Table 4-27: Significant Competencies required in each stages of property development project

Competency	Overall RII	Rank	Rank at each stage of property development														
			a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
Budgetary process	0.757	1	3	1	3	5	2	3	4	1	4	4	1	1	5	6	17
Cost planning	0.753	2	2	3	1	3	8	2	24	2	5	1	5	4	1	5	25
Cost estimating	0.747	3	1	2	1	9	7	1	16	3	11	2	9	11	3	7	20
Government regulation and law	0.730	4	8	13	15	1	13	8	1	7	6	12	3	3	38	2	4
Strategic planning	0.729	5	15	7	5	3	3	7	3	5	7	4	1	1	8	4	27
Cost information database	0.719	6	4	4	9	11	28	8	14	7	4	8	8	14	4	16	11
Professional practice	0.718	7	11	5	4	2	3	8	2	21	11	7	14	17	18	3	9
Quantification and measurement	0.712	8	5	13	9	27	15	4	24	24	3	2	29	29	1	7	3
General procurement advice	0.705	9	7	16	6	16	1	6	24	9	2	10	41	22	20	9	39
Economic of construction	0.696	10	13	9	15	17	15	17	20	5	16	20	10	9	5	11	34

a- Concept, b- Preliminary Market survey, c- Development appraisal, d- Identification & acquisition of site, e- Appointment of design and consultancy team, f-Detail design of development, g-Obtaining of approvals, h-Arrangement of finance, i-Selection and appointment of a suitable contractor, j- Construction, k-Marketing selling & completion, l-Execution of property process, m-Cost benefit analysis, n-BOI rules & regulations,0-Defect liability period.

“Strategic Planning” gets an overall RII of 0.729 and gets overall rank Five (5) in the table and it is getting top ranks for stages like Marketing selling & completion and Execution of property process

“Cost information database” gets similar ranks Eight (8) in Detail design of the development, Construction and Marketing selling & completion and Fourteen (14) in Obtaining of approvals and Execution of property process. General procurement advice gets rank Nine (9) in overall, lowest for a stage of Marketing selling & completion which is Forty one (41) while stages like Preliminary Market survey and Identification & acquisition of site shares an equal amount Sixteen (16). “Economic of construction” takes the bottom of the table (rank 10). In addition gets significant lower ranks in Defect liability period. While Conveying Equal ranks Fifteen (15) Development appraisal, Appointment of design and consultancy team and Twenty (20) in Obtaining of approvals, Construction

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This study would analyze key measures for essential skills and competencies to perform quantity surveyor role in different stages of the property development sector. Data is collected by using primary and secondary sources to achieve research objectives. Analysis of more sources used to storm data identifying skills and competencies in relation to property development giving a clear indication when and where to apply QS services

5.2 Summary of the Study

An attempt made in this research analyzes the objective measure of skills and competencies essential to perform quantity surveyor role in different stages of the property development sector. Data is collected by using primary and secondary sources to achieve research objectives. Secondary sources were used to collect skills and competencies required to perform the QS role, to identify the types of property developments which require Quantity Surveying services and identify the involvement where QS is essential. Expert interview was directed with (08) Eight Chartered quantity surveyors who have more than (20) Years of experience including property development sector in Sri Lankan construction industry to verify the data collected from secondary sources. Literature and Semi-Structured questionnaire survey identified thirty-six (36) skill factors and forty-five (45) competencies factors.

The questionnaire survey was distributed among the 77 no of QS professionals working in different types of organizations such as Client, Consultant, Contractor, and 40 nos were responded. All collected data was analyzed to check the relative importance index to rank the standards giving to their relative importance. The study analyzed the significance of the stages of property development where involvement of QS is essential. The analyzed data depicted in the first stage high important levels in the property development sector where involvement of QS is essential for

"selection and appointment of a suitable contractor" stage with an RII value 0.926. Then analyzed the contribution of each of the skills and competencies required by QS to perform in the property development sector building project life cycle examined and the ranking by use of relative importance index (RII). Analysis in chapter 4 highlighted the significant skills and competencies factors required by QS into fifteen (15) stages in the property development project. All respondents marked twenty-eight (28) skill factors out of thirty-six (36) in a ranking more than RII weight 0.700 and nine (09) competency factors out of forty-five (45) in a ranking more than RII weight 0.700. Finally showed the most significant skills and competencies of quantity surveyors in property development

5.3 Conclusions

Purpose of the research is to necessary skills and competencies applied to property development and briefly demonstrate significance of QS and in giving consideration to gap of research and preliminary facts and figures. Accordingly, research carried on with a mixed approach which contains main data quantitative method of facts or data collected by an expert questionnaire survey. Subsequently, Using Preliminary findings, by collecting and analysis of data, created main objectives which are concluded and demonstrated in preceding chapters.

Objective 1 - Identify the skills and competencies of Quantity Surveyors

This was initiated as the first step in the literature review and finalized with the analysis of findings of expert questionnaire survey which has been derived in subsection 4.2.4.1. The study identified thirty-six (36) skills and forty-five (45) competencies as essential for the Qs.

According to the findings, there were nine (09) additional skills as "industry memory", "Professional membership", "Lateral thinking across many fields", "Contractual knowledge", "Cost feasibility", "Cost responsibility", "Knowledge in economics", "Knowledge in social behavior" and "Market conditions" and five (05) competencies as "Community Management", "Property valuation", "Handing over the project inventory", "COC documentation(Certification of conformity)" and

“Reporting structure” (Material and cost) proposed by professionals which are essential for quantity surveyors working in property development sector in construction industry.

Objective 2 - Objective 2 – findings on types of property development and requirement for QS services

There were four (04) main areas identified from primary and secondary sources such as new building, redesigning, refurbishment and additions. Further same list analyzed with industry professionals during the expert interview. Second objective of the study derived, the literature review and the preliminary interview survey, gathered information is explained in subsection 4.2.4.2 in Chapter 4.

Objective 3 - Identify the significance of the QS involvement at different stages of property development

For evaluating the third objective of this study, in literature review identified the twelve (12) stages which require quantity surveying services essential and three (03) additional stages as “Cost-benefit analysis”, “BOI (Board of Investment) rules and regulations” and “Defect liability period” proposed by industry professionals during the expert interview. The results accomplished explain through subsection 4.2.4.3 in Chapter 4.

After the questionnaire survey found out the significance of the QS involvement at different stages of property development analysing by relative important Index and this study achieved in subsection 4.4 in chapter 4. There were three (03) stages highlighted having a significant essential requirement of QS in the property development sector such as “selection and appointment of suitable contractor” , “construction” and “cost-benefit analysis” stages with RII value 0.926, 0.900 and 0.850.

Objective 4 –Analyze the most significant skills and competencies of Quantity Surveyors at each stage of property development

The contribution of each of the skill and competency required by QS to perform in different stages ranked with RII value to identify the top skills and competencies is tabulated in table 4.5 to table 4.19. Further identified, the high significance skills and competencies of QS to perform property development in different stages represented in table 4.20. Table 4.21 depicted five most significant skills and competencies of QS to perform property development sector.

Secondary data sources and the questionnaire helped to analyse, information, and attitudes of construction organization quantity surveyors towards the skills and competencies of QS of property development which require quantity surveyor is essential by using their experience in the industry

Objective 5 – Analyze the most significant skills and competencies of Quantity Surveyors in property development.

There were ten significant skills and competencies essential for QSs in property development sector analyzed to achieve this objective.

Ten significant skills were 1. Documentation, 2.Communication, 3.Evaluation, 4.Analysis, 5.Teamwork, 6.Quantification, 7.Problem solving, 8.Management, 9.Coordination, 10.Negotiation.

Ten significant competencies were 1. Budgetary process 2. Cost planning, 3.Cost estimating, 4.Government regulation and law, 5.Strategic planning, 6.Cost information database, 7.Professional practice, 8.Quantification and measurement, 9.General procurement advice, 10.Economic of construction.

5.4 Recommendations

Modern day civil construction is rapidly developing due to innovation and having significant changes due to external and internal environmental factors which recognised globally more in to physical awareness of a project. Identifying specific and important skills and competencies for high demand in modern day construction is a key component for construction companies or bodies which needed for effective results. In order Achieve better qualitative and quantitative results, these organisations seek specialized people with impressive skills and proven records. Property development sector depends on skills of QS Throughout an entire construction project to obtain better cost effective plans, recommendations and procedures produce better investment opportunities among shareholders or 3rd party lenders and create future fail proof plans and cash flow for project costs. While ongoing property development going through fast and rapid development, QS needs to support developers overall financial goals, facilitate and gain necessary skills and competencies and focus on key areas of a project giving attention to present and future changes and values.

5.5 Suggestions for further research

The research will lead in to following recommendations by investigating objectives and findings. Preliminary investigations suggested by individual opinion and expert responses and reviews.

- Skills and Competencies required by construction professionals in property development
- Skills and competencies required by construction professionals in sustainable construction

REFERENCE

- Abidin, N.Z., Adros, N.A. and Hassan, H. (2014), "Competitive strategy and performance of quantity surveying firms in Malaysia", *Journal of Construction in Developing Countries*, Vol.19 No.2, p.15
- Addai, J.P., Nkuah, M. and Amoah, P. (2009), "The Ghanaian quantity surveying and the emerging oil and gas industry", *The Quantity Surveyor*, Vol.2, pp.7-16
- Ajanlekoko, J.O. (2012), From Thermometer to Thermostat: The challenging role for Quantity Surveyors in the 21st Century, *The Quantity Surveyor: Journal of the Nigerian Institute of Quantity Surveyors*, 1(1) 40-41. Retrieved from: http://www.academia.edu/download/38585181/G_O_Jagboro.pdf.
- Akadiri O.P., 2011, Development of a Multi –Criteria Approach for the Selection of Sustainable Materials for Buildings Projects, Ph. D. Thesis, University of Wolverhampton, Wolverhampton, UK
- Alhojailan, & Ibrahim, M. (2012). Thematic analysis: a critical review of its process and evaluation. In *WEI International European Academic Conference Proceedings*, (pp.8-21). Retrieved from <http://www.westeastinstitute.com/wp-content/uploads/2012/10/ZG12-191-Mohammed-Ibrahim-Alhojailan-Full-Paper.pdf>.
- Altona I., 2012. Residential Property Development: A Framework for Successful Development. 2nd ed. London: Macmillan Education Ltd
- Alyami, S.H., & Rezgui, Y. (2012). Building an assessment tool development approach. *Sustainable Cities and Society*, 5(1), 52-62. DOI: [org/10.1016/j.scs.2012.05.004](https://doi.org/10.1016/j.scs.2012.05.004)
- Ashworth, A., Hogg, K., & Higgs, C. (2013). *Willis's practice and procedure for the quantity surveyor*. Hoboken: Wiley.
- Australian Institute of Quantity Surveyors. (2012). National Competency Standards for Quantity Surveyors-Construction Economics (ISBN 1-876389-02-8).

- Baccarini, D (2004). The Logical Framework Method for Defining Project Success. *Project Management Journal*, 30(4), 25-32
- Badu, E., & Amoah, P. (2004). Quantity surveying education in Ghana. *The Ghana Engineer*, 1-12. Retrieved from www.icoste.org/GhanaEdu.pdf.
- Baccarini, D (2004). The Logical Framework Method for Defining Project Success. *Project Management Journal*, 30(4), 25-32.
- Badu, E., & Amoah, P. (2004). Quantity surveying education in Ghana. *The Ghana Engineer*, 1-12. Retrieved from www.icoste.org/GhanaEdu.pdf.
- Bertelsen, S., and Sacks. (2007), " Towards a new understanding of the construction industry and the nature of its production ", Proceedings of the IGLC, pp.46-56, accessible at [http://prosjekt.uia.no/uwc/wp-content/transfers/Bertelsen-S.-and-Sacks-R.-Towards another Understanding of the Construction Industry and the Nature of its Production.pdf](http://prosjekt.uia.no/uwc/wp-content/transfers/Bertelsen-S.-and-Sacks-R.-Towards%20another%20Understanding%20of%20the%20Construction%20Industry%20and%20the%20Nature%20of%20its%20Production.pdf) (accessed 3 May 2016).
- Birrell, G., & Gao, S. (1997). The property development process of stages and their degrees of importance. *Cutting edge*. available at: [www.https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Birrell+G%2C+Gao+S.+%281997%29+The+Property+Development+Process+of+Stages+and+their+Degrees+of+Importance+RICS+Cutting+Edge+Conference%2C+Dublin+www.rics-establishment.Org.uk&btnG=](https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Birrell+G%2C+Gao+S.+%281997%29+The+Property+Development+Process+of+Stages+and+their+Degrees+of+Importance+RICS+Cutting+Edge+Conference%2C+Dublin+www.rics-establishment.Org.uk&btnG=) (Accessed 10 May 2016).
- Bowen, P., Cattell, K., Edwards, P., & Jay, I. (2010). Value management practice by South African quantity surveyors. *Facilities*, 28(1/2), 46-63
- Brandon, P.S. (1994). *Quantity surveying Techniques: New Directions* (1st ed.) (P. S. Brandon, Ed.) London: blackwell Scientific Publications
- Burnside K. and Westcott A.J., 2014. Market Trends and Development in QS Services. *Cobra*, 1, 88-102
- Bulloch, B. B. E., & Sullivan, J. (2009). *Application of the Design Structure Matrix (DSM) to the real estate development process* (Doctoral dissertation, Massachusetts Institute of Technology). available

at:www.https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Bullo
ch%2C+B.B.E.+and+ Sullivan%2C+ J.%2C+2009.+Application+ of+the+
Design+Structure+Matrix+%28DSM%29+to+the+real+estate+development
+process+&btnG=(Accessed 26 April 2016).

Cadman, D., & Topping, r. (1995). Property development. Taylor & Francis.
Available at: www.
[https://scholar.google.com/scholar?hl=en&as_sdt=2005&scioldt=0%2C5&cit
es=12258000178316349345&scipsc=&q=Cadman%
2C+D.+and+Topping%2C+R.%2C+1995.+Property+development.+Taylor+
%26+Francis.&btnG=\(Accessed10 April 2016\).](https://scholar.google.com/scholar?hl=en&as_sdt=2005&scioldt=0%2C5&cit
es=12258000178316349345&scipsc=&q=Cadman%
2C+D.+and+Topping%2C+R.%2C+1995.+Property+development.+Taylor+
%26+Francis.&btnG=(Accessed10 April 2016).)

Cartlidge, D. (2011). *New aspects of quantity surveying practice* (3rd ed.). United
States of America: Spon Press.

Cartlidge, D. (2012). *New Aspects of Quantity Surveying Practice*. Oxon: Spon
Press.

Central Bank of Sri Lanka. (2019, April). *Annual report 2018*. Colombo: Central
Bank of Sri Lanka. Retrieved from [https://www.cbsl.gov.lk/en/
publications/economic-and-financial-reports/annual-reports/annual-report-
2018](https://www.cbsl.gov.lk/en/
publications/economic-and-financial-reports/annual-reports/annual-report-
2018).

Chamikara P.B.S, Perera, B.A.K.S & Rodrigo M.N.N (2018) Competencies of the
quantity surveyor in performing for sustainable construction, International
Journal of Con. Management, DOI: 10.1080/15623599.2018.1484848

Chandrasiri, R. (2010). Challenges facing the establishment of the quantity
surveying profession in Sri Lanka. *SLQS Journal*, 24-27.

Cheah, C. Y., & Ting, S. K. (2003). Appraisal of value engineering in construction
in Southeast Asia. *International Journal of Project Management*, 23(2), 151–
158. doi:10.1016/j.ijproman.2004.07.008

Cheunga, N. F., Cheunga, C. C., & Fellows, R. (2014). Power, Leadership and
Cultures in Quantity Surveying Practices in Hong. *International Journal of
Construction*, 7(1), 29-42.

- Chong, B.L., Lee, W.P., & Lim, C.C. (2012). The roles of graduate quantity surveyors in the Malaysian construction industry. In *International Conference on Management and Education Innovation*, 37, (pp. 17-20). Retrieved from www.ipedr.com/vol37/004-ICMEI2012-E00012.pdf
- Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches*. London: Sage Publications.
- Crown, H. j., & Smith, P.R. (2004), *Dictionary of Architecture and Building Technology*. London: Spon Press.
- Dada, J.O. and Jagboro, G.O. (2012), “Core skills requirement and competencies expected of quantity surveyors: perspectives from quantity surveyors, allied professionals and clients in Nigeria”, *Australasian Journal of Construction Economics and Building*, Vol. 12 No. 4, pp.78-90
- Dayarathna, D. (1996). Property Development an Integral part of the Fabric of the Economy, *Quantity Surveyor*. 91-92,94-95 .
- Dawson, C. (2009). *The Complete Guide to Property Development for the Small Investor: How to Identify the Best Opportunities in a Volatile Property Market*. Kogan Page Publishers.. available at: [www.https://scholar.google.com/scholar?q=Dawson+2009+property+development&hl=en&as_sdt=0&as_vis=1&oi=scholart](https://scholar.google.com/scholar?q=Dawson+2009+property+development&hl=en&as_sdt=0&as_vis=1&oi=scholart) (Accessed 20 April 2016).
- Dominy C. (2013) The Impacts of Heritage Requirements on the Financial Viability of Individual Development Proposals.[Online] Available at: http://www.heritage.nsw.gov.au/docs/economics_partb1.pdf [Accessed on 01st July 2016]
- Dubois, A., & Gadde, L. E. (2012). The construction industry as a loosely coupled system: implications for productivity and innovation. *Construction Management and Economics*, 20(7), 621-631. doi:10.1080/01446190210163543
- Easterby-Smith, M., Thorpe, R. & Lowe, A. (2002). *Management research: an indication*. London: Sage Publications.

- Ebohon, O.J., Field ,B.G., Mbuga ,R.R., & Mullins, A.(2011). Conceptual Analysis of the Problems Associated with Real Property Development in Sub-Saharan Africa, *Property Management*, 20 (1),7 – 22
- Fan, M., Lin, N. P., & Sheu, C. (2008). Choosing a project risk handling strategy: An analytical model. *International Journals of Production Economics*, 112(2), 700-713. doi:DOI:10.1016/j.ijpe.2007.06.006
- Fanous,A., & Mullins, A.(2012).*Surveying the field:changes in quantity surveying*.Retrieved from <http://www.smashwords.com/books/download/215763/1/latest/0/0/surveying-the-field-changes-in-quantity-surveying.pdf>.
- Fellows, R., Liu, A., & Fong, C. M. (2002). Leadership style and power relations in quantity surveying in Hong Kong. *Construction Management and Economics*, 21(8), 809–818.
- Fisher, P. (2005). The property development process: Case studies from Grainger Town. *Property Management*, 23(3), 158-175. available at: [https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Fisher%2C+P.+%282005%29%2C+%22The+property+development+process%3A+Case+studies+from+Grainger+Town%22%2C+Property+Management%2C+Vol.+23+No.+3%2C+pp.+158-175.&btnG=\(Accessed 8 May 2016\)](https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Fisher%2C+P.+%282005%29%2C+%22The+property+development+process%3A+Case+studies+from+Grainger+Town%22%2C+Property+Management%2C+Vol.+23+No.+3%2C+pp.+158-175.&btnG=(Accessed%208%20May%202016)).
- Ganiyu, B.O., Oyewobi, L.O., Nwokobia, L. and Sulaiman, B. (2012), “Diversification and performance of quantity surveyors in Nigerian construction industry”,Proceedings of RICS COBRA 2012 Conference, 11th-13th September 2012,AZ State University,NV
- Gangolells, M., Casals, M., Gasso, S., Forcada, N., Roca, X., & Fuertes, A. (2008). A methodology for predicting the severity of environmental impacts related to the construction process of residential buildings. *Building and Environment*, 44(3), 558-571. doi:10.1016/j.buildenv.2008.05.001.

- Gayathri, Y. (2014). *Competencies expected by construction industry from graduate Quantity surveyors* (unpublished B.Sc. dissertation). University of Moratuwa, Sri Lanka.
- Ginige, K.N., 2005, *Public image on the construction industry: an opinion survey*, Unpublished Dissertation (BSc). University of Moratuwa, Sri Lanka.
- Glucha, P., & Baumann, H. (2003). The life cycle costing (LCC) approach: a conceptual discussion of its usefulness for environmental decision-making. *Building and Environment*, 39(1), 571 – 580.
- Greg, C., Ferdinand, P. (2010). Property Development Principles and Process – An Industry Analysis, *Pacific Rim Property Research Journal*, 16:2, 171-189, available at: <https://www.tandfonline.com/action/showCitFormats?doi=10.1080%2F14445921.2010.11104300> (Accessed 20 April 2016).
- Hamshayini, K., 2007. *Construction project : further consideration for contractors pricing in Sri Lanka*. Unpublished Dissertations (BSc). University of Moratuwa, Sri Lanka.
- Harvey J., 1987. *Urban Land Economics*. 2nd ed. London: Macmillan Education Ltd.
- Hawkins. (2013). *Quantity surveyors offer help with new insurance form*. Retrieved from <http://www.propbd.co.nz/quantity-surveyors-offer-help-with-new-insurance-form>.
- Hemajith, S.D.M., Perera, B.A.K.S., Amaratunga, D. and Ginige, K.N. (2007), “Quantity surveyor as the technical appraiser in the Sri Lankan financial industry”, *Proceedings of the 3rd Annual Built Environment Education Conference of the Centre for Education in the Built Environment*, pp. 1-12, available at: www.disaster-resilience.salford.ac.uk/ (accessed 26 October 2014).

- Holmes, L., & Joyce, P. (1993). Rescuing the useful concept of managerial competence: from outcomes back to process. *Personnel Review*, 220, 37-52.
- Horta, I.M., Camanho, A.S., Johnes, J., & Johnes, G. (2012). Performance trends in the construction industry worldwide: an overview of the turn of the century. *Journal of Productivity Analysis*, 39(1), 89-99. doi: 10.1007/s11123-012-0276-0.
- Hussain, A. H., Khairi, M., Husain, A., Irfan, A., Ani, C., Irza, N., & Ali, Z. M. (2010). New aspects of quantity surveyor skills and competencies: A pilot study. *European Journal of Advances in Engineering and Technology*, 2(12), 11–20.
- IQSSL Quantity Surveying professional competencies Quantity Surveying Practices. Retrieved from <http://www.quantity-surveying-practices.com/2015/03/iqssl-quantity-surveying-professional.html>.
- Ishak, N., Ibrahim, F. A., & Azizan, M. A. (2018). Analysis of Factors Influencing Building Refurbishment Project Performance. In *E3S Web of Conferences* (Vol. 34, p. 01013). EDP Sciences. Available at: www.https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&as_vis=1&q=https%3A%2F%2Fwww.e3s-conferences.org%2Farticles%2F3sconf%2Fpdf%2F2018%2F09%2F3sconf_cenviron_2018_01013.pdf&btnG= (Accessed 22 April 2016).
- The Institute of Quantity Surveyors Sri Lanka. (2015). *The institute of quantity surveyors, Sri Lanka – Towards excellency in professionalism*. Retrieved from <http://www.iqssl.lk/about/vision.php>
- Jeou-Shyan, H., Hsuan, H., Chih-Hsing, L., Lin, L., & Chang-Yen, T. (2011). Competency analysis of top managers in the Taiwanese hotel industry. *International Journal of Hospitality Management*, 30, 1044–1054.

Jeyamathan, S.J. (2006). *Identifying and analysing duties and skills of quantity surveyors in Srilanka* (Unpublished bachelor's dissertation). University of Moratuwa, Sri Lanka.

Jha, Neeraj, K., & Deveya, M. N. (2008). Modelling the risks faced by Indian construction companies assesing international projects. *Journal of Construction Management and Economics*, 26(4), 337-348. doi:10.1080/01446190801953281

Modelling the risks faced by Indian construction companies assesing international projects.

Kelly, J., Male, S., & Graham, D. (2004). *Value Management of Construction Projects*. Oxford: Blackwell Science. Retrieved from https://books.google.lk/books?hl=en&lr=&id=MnTCBwAAQBAJ&oi=fnd&pg=PA239&dq=Value+Management+of+Construction+Projects+kelly+&ots=03Vy_68&sig=vUe5i4WoYzpL3MwJnwoBqriB5X4#v=onepage&q=sustainability&f=false.

Kerzner, H., 2011, *Project management: A System approach to Planning, Scheduling & Controlling*, 7th ed. Wiley & Sons, Inc: New York.

Kim, C., Kyung Hoon Yang, K.H. and Kim, J. (2008), "A strategy for property development systems: a case analysis using the blue ocean strategy", *Omega*, Vol .36 No. 4, pp. 522-534

A strategy for property development systems: a case analysis using the blue ocean strategy

Kothari, C.R. (2004). *Research methodology Methods and Techniques*. New Dheli: New Age International (Pvt) Ltd.

Kumar, R. (2011). *Research Methodology* (2nd ed.). London: Sage Publications Ltd.

Lee, C.C., Perera, S. and Hogg, K. (2013), "An analysis of early career training requirements for quantity surveying professionals", *International Journal of Strategic Project Management*, Vol. 17 No. 2, pp. 161-175

An analysis of early career training requirements for quantity surveying professionals

Lee, S., Trench, W., & Willis, A. (2011) *Willis's Elements of Quantity Surveying* (11th ed.). West Sussex: Wiley-Blackwell

Lenard, D. (2000). Future Challengers in cost Engineering: Creating Cultural Change Through the Development of Core Competencies. *AACE International Transactions*

Lowe, J.L. (2003). *Construction Economics*. Retrieved from [www.callnetuk.com/home/john 70](http://www.callnetuk.com/home/john%2070). The Australian institute of quantity surveyors proposal on the tax agent facilities regulations (exposure draft), made under the tax agents

Lowry, J. (2009). The Australian institute of quantity surveyors submission on the tax agent services regulations(exposure draft), made under the tax agents services act 2009. Retrieved from http://archive.treasury.gov.au/documents/1632/PDF/Australian_Institute_of_Quantity_Surveyors.pdf.

Mauch, J. E. & Park, N. (2003). *Guide to the successful thesis and dissertation: A handbook for students and faculty* (5th ed.). Boca Raton: Taylor and Francis group.

Meyer, T., & Semark, P. (1996). A framework for the use of competencies for achieving competitive advantage. *South African Journal of Business Management*, 27(4), 96-103.

Murphy, R. (2011) "Strategic planning in Irish quantity surveying practices", available at: <http://arrow.dit.ie/cgi/viewcontent.cgi?article=1003&context=beschreoth>.

- Murphy, R. (2013), “Strategic planning in construction professional service firms: a study of irish QS practices”, *Construction Management and Economics*, Vol. 31 No. 2, pp. 151-166.
- Nagalingam, G., Jayasena, H. S., & Ranadewa, K. A. (2013). Building Information Modelling and Future Quantity Surveyor’s Practice in Sri Lankan Construction Industry. *The Second World Construction Symposium 2013*. Colombo.
- Naoum, S. G. (2007). *Dissertation Research and writing for construction students* (2nd ed.). UK: Oxford.
- Nikado, R., & Meyer, T. (2001). Competencies of professional quantity surveyors: a South African perspective. *Construction Management and Economics*, 19(5), 481-491
- Ofori , G. (2012). New Aspects of Quantity Surveying Practice. *Construction Management and Economics*, 30(12), 1103–1112.
- Ofori, G. and Toor, S.R. (2012), “Role of leadership in transforming the profession of quantity surveying”, *Construction Economics and Building*, Vol. 9 No. 1, pp. 37-44.
- Olanipekun, A.O., Aje, I.O. and Abiola-Falemu, J.O. (2013), “Effects of organisational culture on the performance of quantity surveying firms in Nigeria”, *International Journal of Humanities and Social Science*, Vol.3No.5,pp.206-215.
- Olanrewaju, A. and Anahve, P.J. (2015), “Duties and responsibilities of quantity surveyors in the procurement of building services engineering”, *Procedia Engineering*, Vol. 123 No. 1, pp. 352-360

- Olatunde, J. (2006), “New opportunities for quantity surveyors in Nigeria business environment”,NIQS 22nd Biennial Conference, 22nd-25th November, 2006,Calabar.
- Olatunji, O.A. (2007), “Conflict of interest within construction practitioners: quantity surveying, case study”,*Surveying and Built Environment*, Vol. 18 No. 1, pp. 35-50.
- Pacific Association of Quantity Surveyors. (2015). *About PAQS*. Retrieved from <http://www.paqs2015.com/en/about-PAQS.php>
- Pacific Association of Quantity Surveyors. Retrieved from <http://www.paqs.net>.
- Perera, S., Pearson, J.,& Dodds, L. (2010). *Alignment of professional, academic and industrial development needs for quantity surveyors*. In *RICS COBRA Research Conference*, (pp. 1-20). Retrieved from <http://nrl.northumbria.ac.uk/13011>.
- Perera, S., Pearson, J., Zhou, L. and Ekundayo, D. (2011), “Mapping RICS quantity surveying competencies to curricula of RICS accredited programmes”, *Proceedings of the 15th Pacific Association of Quantity Surveyors Congress*, available at: <http://nrl.northumbria.ac.uk/7141/> .
- Perera, S., Pearson, J., Zhou, L., & Ekundayo, D. (2012). Developing a graduate competency mapping benchmark for quantity surveying competencies. In *COBRA 2012 conference*, (pp. 1-8). Retrieved from <http://core.kmi.open.ac.uk/display/9990673>
- Potts, K. (2008). Change in the quantity surveying profession. In H. Smyth, & S. Pryke, *Collaborative Relationships in Construction: Developing Frameworks and Networks* (pp. 42-58). West Sussex: Blackwell Publishing Limited.

- Punch, K.F. (2005). *Introduction to social research: Quantitative and qualitative approaches* (2nd ed.). London: Sage publications Ltd.
- Rahim, F.A., Abd-Rahman, H., Wang, C., Othman, N.D. and Zainon, N. (2013), “Quantity surveying firms survival of fast developing economy”, *Journal of Surveying, Construction and Property*, Vol. 4 No. 1, pp. 1-18.
- Rameezdeen, R. (2006). Construction sector in Sri Lanka. *COWAM Seminar*. retrieved from http://cowam.tec-hh.net/060419_Construction_Sector_SL.pdf
- RICS. (1991). *Quantity Surveying 2000*. London: RICS.
- Royal Institution of Chartered Surveyors (RICS) (2014), “Assessment of professional competence, royal institution of chartered surveyors, London”, available at: www.rics.org/Global/RICS-APCRequirements-and-Competencies-Aug-2014-WEB.pdf(accessed 10 April 2016).
- Rudestam, K.E., & Newton, R.R. (2007). *Surviving your dissertation: A comprehensive guide to content and process* (3rd ed.). United States of America: Sage publications.
- Said, I., Shafiei, M.W.H., & Omran, A. (2010). The competency requirements for quantity surveyors: enhancing continuous professional development. *ACTA Technica Corniensis – Bulletin of Engineering*, 3, 105-112.
- Schoenmaker, D.A.J., Van der Vlist, A.J. (2015) on real estate development activity: the relationship between commercial and residential real estate markets. *Lett Spat Resour Sci* 8, 219 – 232. available at: www.https://doi.org/10.1007/s12076-015-0144-4 (Accessed 10 May 2016).
- Seeley, I.H. (1997). *Quantity surveying practice* (2nd ed.). United Kingdom: Palgrave Macmillan.

- Senaratne, S., & Sabesan, S. (2008). Managing knowledge as quantity surveyors: An exploratory case study in Sri Lanka. *Built-Environment - Sri Lanka*, 8(2), 41-47.
- Shafiei, M.W.M. and Said, I. (2008), "The competency requirements for quantity surveyors: enhancing continuous professional development", *Sri Lankan Journal of Human Resource Management*, Vol.2No.1, pp.17-2
- Shen, Q., & Chung, J.K.H. (2006). The use of information technology by the quantity surveying profession in Hong Kong. *International Journal of Project Management*, 25 (2007), 134–142.
- Simms, N. (2012). Sustainability and procurement. In D. Cartlidge, *New aspects of quantity surveying practice* (3rd ed., pp. 47-80). Oxon: Spon Press.
- Smith, P. (2009), "Trends in the Australian quantity surveying profession: 1995-2008", *Proceedings of the 13th Pacific Association of Quantity Surveyors Congress*, pp. 1-15, available at: www.icoste.org/korev2009a.pdf (accessed 17 October 2016).
- Smith, P. (2004), "Trends in the Australian quantity surveying profession: 1995-2003", *Proceedings of the International Cost Engineering Council 4th World Congress*, pp. 1-15, available at: www.icoste.org/korev2004a.pdf (accessed 17 October 2016).
- Tan, W. (2002). *Practical research methods*, Singapore: Prentice Hall.
- Tayalan, Q., Bafail, A. O., Abdulaal, R. M. S., & Kabli, M. R. (2014). Construction projects selection and risk assessment by fuzzy AHP and fuzzy TOPSIS methodologies. *Applied Soft Computing*, 17(1), 105–116. doi:10.1016/j.asoc.2014.01.003
- The Australian Institute of Quantity Surveyors. (2013). Australian Institute of Quantity Surveyors. Retrieved from <http://www.aiqs.com.au/site.php?id=27>

- The Institute of Quantity Surveyors Sri Lanka. (2013). *The institute of quantity surveyors, Sri Lanka – Towards excellency in professionalism*. Retrieved from <http://www.iqssl.lk/about/vision.php>
- Thomas, R. M., & Brubaker, D. L. (2008). *Thesis and dissertations: A guide to planning, research and writing*, California, Sage Publications Inc.
- Thesis and dissertations: A guide to planning, research and writing, California, Wang, N. (2014). The role of the construction industry in china's sustainable urban development. *Habitat International*, 44(1), 442–450.
- Usilappan M., (2013), Meeting the land inquire about interest of the new economy "Towards a borderless land industry", *The Malaysian Surveyor*, 1st quarter, 36 - 41.
- Yin, R. K. (2009). *Case study research: Design and methods* (3rd ed.). Retrieved from <http://faculty.washington.edu/swhiting/pols502/Yin.pdf>
- Yogeshwaran, G., Perera, B.A.K.S. and Perera, K.T.P.K. (2014). Skills and Competencies expected of graduate quantity surveyors by the construction industry at present and future. *FARU Journal*, 6(1). 7-17. Retrieved from <http://www.mrt.ac.lk/foa/faru/archives/FARU%20Journal%202014.pdf>.
- Yogeshwaran G, Perera B.A.K.S, Ariyachandra MFM. 2018. Competences expected of graduate Quantity surveyors working in developing countries. *J Financ Manage Property Construct*. 23(2):135–153.
- Zainudin, N., Palliyaguru, R., Nirooja, T and Mullians.T (2006). Career Paths in Quantity Surveying. *In Customizing the Quantity Surveyor to Face Challenges in Year 2020*, (pp. 43-58).

INTERVIEW GUIDELINE

**QUANTITY SURVEYORS SKILLS AND COMPETENCIES ESSENTIAL FOR
PROPERTY DEVELOPMENT SECTOR**

Dear Sir/Madam,

I, Soba Dissanayake, currently following a Degree of Master of Science in Project Management at University of Moratuwa. For completing the requirements of this Degree Certification, research has to be undertaken and a Dissertation has to be produced with the research findings. Hence I have decided to conduct the research on the topic of “**Quantity Surveyors skills and competencies essential for the property development sector**”, which the information from this interview will be used. The interview will be carried out only to fulfil the requirements of the Dissertation for the award of Degree of Master of Science in Project Management at the University of Moratuwa. Through this interview, I am looking forward to validating the findings of the above two desk reviews.

Questionnaire survey are conducted with industry experts in Quantity Surveying who have an idea of property development projects. Each interview session will approximately proceed for 20 minutes. Interview sessions will be tape- recorded (with the consent of the interviewee) to avoid missing and/or misinterpreting any information provided by the interviewee. However, the actual names of the interviewees and the name of their organizations will not be revealed in the report or any other documents relating to this study to maintain confidentiality.

I would be thankful if you could kindly spend time to take part in the interview and provide your opinions regarding the findings of the above Desk Reviews.

Thank you!

Yours faithfully,

MSS Dissanayake

Quantity Surveyor

Sri Lanka Navy

Email:mudud@yahoo.com | Mob:0718359945

GENERAL INFORMATION

- Name of the Organization :
- Type of the Organization :
- Designation :
- Profession :
- Experience (Years) :
- Date of interview :
- Venue :
- Time :

STUDY QUESTIONS

A. What are the skills required by Quantity Surveyors for property development?

Sr no	skills	Agree {✓} / Disagree {x}	Remarks
1	Analytical/Analysis skill		
2	Appraisal/Evaluation		
3	Communication		
4	Documentation		
5	Management		
6	Quantification		
7	Teamwork		
8	Problem Solving		
9	Self-management		
10	Planning and organizing		
11	Technology		
12	Lifelong learning		
13	Initiative and Enterprises		
14	Leadership		

Sr no	skills	Agree {✓} / Disagree {x}	Remarks
15	Critical thinking		
16	Conflict resolution		
17	Interpersonal		
18	Administrative		
19	Confidence		
20	Presentation		
21	Negotiation		
22	Computer skills		
23	Coordination		
24	Content Strategy		
25	Efficiency		
26	Legal Familiarity		
27	Flexibility		

Specify the other skills:

- 1)
- 2)
- 3)
- 4)

B. Listed competencies of quantity surveyor will be required in property development project (New building construction)?

Sr	List of competencies of quantity surveyor	Agree {✓} /Disagree {x}	Remarks
1	Strategic planning		
2	Budgetary process		
3	Cost estimating		
4	Cost planning		

Sr	List of competencies of quantity surveyor	Agree {✓} /Disagree {x}	Remarks
5	General procurement advice		
6	Quantification, measurement and documentation		
7	Tendering process		
8	Account management		
9	Construction change management		
10	Claims and dispute resolution		
11	Financial audit		
12	Resource analysis		
13	Computer services		
14	Construction technology		
15	Government regulation and law		
16	Arbitration		
17	Expert witness/evidence		
18	Business management		
19	Research and development		
20	Cost information database		
21	Feasibility studies		
22	Life cycle cost analysis		
23	Tax depreciation		
24	Special assessment		
25	Audits		
26	Technical due diligence		
27	Compliance issues		
28	Project value management		
29	Project management		
30	Project risk management		
31	Quality Assurance		

Sr	List of competencies of quantity surveyor	Agree {✓} /Disagree {x}	Remarks
32	Contract administration		
33	Insurance		
34	Property Investment Funding		
35	Development Appraisal		
36	Facilities Management		
37	Economic of construction		
38	Personal and Interpersonal skills		
39	Professional practice		
40	BIM		

Specify the other competencies:

- 1)
- 2)
- 3)
- 4)
- 5)

C. What are the stages where the involvement of Quantity Surveyors is essential in property development (New building Construction)?

Sr No	stages where the involvement of Quantity Surveyors	Agree {✓} / Disagree {x}	Remarks
1	Concept		
2	Preliminary Market survey		
3	Development appraisal		
4	Identification & acquisition of site		
5	Appointment of design and consultancy team		
6	Detail design of development		

Sr No	stages where the involvement of Quantity Surveyors	Agree {✓} / Disagree {x}	Remarks
7	Obtaining of approvals		
8	Arrangement of finance		
9	Selection and appointment of a suitable contractor		
10	Contraction		
11	Marketing , Selling & Completion		
12	Execution of property process		

Specify the other stages where the involvement of Quantity Surveyors:

- 1)
- 2)
- 3)
- 4)
- 5)

D. What are the types/categories of property development involvement for Quantity Surveyors.

Sr No	Types/categories of property development where the involvement for Quantity Surveyors	Agree {✓} / Disagree {x}	Remarks
1	Construction of new buildings on new lands		
2	Re-designing		
3	Refurbishment/restorations		
4	Additions		

Specify the other types of property development where the involvement of Quantity Surveyors:

- 1)
- 2)
- 3)
- 4)

E. Do you have any suggestion that would enlighten the outcome of my research?

.....
.....

I highly appreciate your contribution to my dissertation. I will be happy to share the outcome of this research with you, if you are interested.

Thank you!

QUESTIONNAIRE SURVEY

QUANTITY SURVEYORS SKILLS AND COMPETENCIES ESSENTIAL FOR PROPERTY DEVELOPMENT SECTOR

I, Soba Dissanayake, currently following a Degree of Master of Science in Project Management at University of Moratuwa. Hence I have decided to research on the topic of “**Quantity Surveyors skills and competencies essential for the property development sector**”, which the information from this questionnaire survey will be used.

This research aims to identify quantity surveying skills and competencies in the property development .I would be much obliged if you could complete the attached questionnaire within your busy work schedule. **The information furnished here will only be used to complete my dissertation and all of your information will be treated confidentially by the research team.** Your early responses would be highly appreciated since I have to undergo with a tight schedule.

Thanking you in advance in anticipation of your kind collaboration.

Thank you!

Yours faithfully,

MSS Dissanayake

Quantity Surveyor

Sri Lanka Navy

Email:mudud@yahoo.com | Mob:0718359945

INTRODUCTION

1.1 SUBJECT OF THE RESEARCH

Quantity surveyors skills and competencies essential for the property development sector

1.2 AIM OF THE RESEARCH

To identify the skills and competencies required by Quantity Surveyors to provide an effective and efficient service to the property development projects.

1.3 OBJECTIVES OF THE RESEARCH

- 1) Identify the skills and competencies of Quantity Surveyors.
- 2) Identify the types of property developments which require Quantity Surveying services.
- 3) Identify the stages where the involvement of Quantity Surveyors is essential.
- 4) The significant skills and competencies of quantity surveyors at each stage of property development.
- 5) Analyze the most significant skills and competencies of quantity surveyors in property development.

1.4 INSTRUCTION TO RESPONDENTS

- ✓ Please fill the tables with your own experience or your observations.
- ✓ This shall be taken up **approximately 40 minutes** of your time.

SECTION A - GENERAL INFORMATION

1. Type of the Organization

Client Consultant Contractor Other

2. Experience as a quantity surveyor

5-10 Years 11-15 Years 16-20 Years 21-25 Years

over 25 Years

SECTION B – STUDY QUESTIONS

1. Please rank (√) the each stage of property development where the involvement of Quantity Surveyors is essential using following scale.

1	2	3	4	5
Not Significant at all	Not Significant	Significant	Highly Significant	Very Highly Significant

Sr No	Stages of Property Development	Rank				
		1	2	3	4	5
1	Concept					
2	Preliminary market survey					
3	Development appraisal					
4	Cost benefit analysis					
5	Identification & acquisition of site					
6	Appointment of design and consultancy team					

Sr No	Stages of Property Development	Rank				
		1	2	3	4	5
7	Detail design of development					
8	Obtaining of approvals					
9	BOI rules and regulations					
10	Arrangement of finance					
11	Selection and appointment of a suitable contractor					
12	Construction					
13	Marketing , selling & completion					
14	Execution of property process					
15	Defects liability period					

✓ Please rank each quantity surveying competency with each approach/ method using following scale

1	2	3	4	5
Not Significant at all	Not Significant	Significant	Highly Significant	Very Highly Significant

✓ Rank the relevancy of each quantity surveying **skill/Competency** with each stages in property development sector

✓ Following figure is a part of a filled questionnaire which gives guidance for you.

Sr No	Skill	Concept (S1)	Preliminary market survey (S2)	Development appraisal (S3)	Cost benefit analysis (S4)	Identification & acquisition of site (S5)	Appointment of design and consultancy team (S6)	Detail design of development (S7)	Obtaining of approvals (S8)	BOI rules and regulations (S9)	Arrangement of finance (S10)	Selection and appointment of a suitable contractor (S11)	Construction (S12)	Marketing , selling & completion (S13)	Execution of property process S(14)	Defects liability period (S15)
	Stages															
1	Analysis	1	2	2	1	1	2	2	1	2	2	2	2	2	2	2
2	Evaluation	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

(1) Identify the most significant skills required by quantity surveyor to perform in **property development sector in following stages**

Sr No	Skill	Stages	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15
1	Analysis																
2	Evaluation																
3	Communication																
4	Documentation																
5	Management																
6	Quantification																
7	Teamwork																
8	Problem solving																
9	Self-management																
10	Planning and organizing																
11	Technology																
12	Lifelong learning																

Sr No	Skill	Stages	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15
13	Initiative and enterprises																
14	Leadership																
15	Critical thinking																
16	Conflict resolution																
17	Interpersonal																
18	Administrative																
19	Confidence																
20	Presentation																
21	Negotiation																
22	Computer skills																
23	Coordination																
24	Content strategy																
25	Efficiency																

Sr No	Skill	Stages	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15
26	Legal familiarity																
27	Flexibility																
28	Industrial memory																
29	Professional membership																
30	Lateral thinking across many fields																
31	Contractual knowledge (FIDIC/SBD)																
32	Cost feasibility																
33	Cost responsibility																
34	Knowledge in economics																
35	Knowledge in social behaviour																
36	Market condition																

(2) Identify the most significant competencies required by quantity surveyor to perform in **property development sector in following stages.**

Sr No	Competency	Stages															
		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	
1	Strategic planning																
2	Budgetary process																
3	Cost estimating																
4	Cost planning																
5	General procurement advice																
6	Quantification and measurement																
7	Tendering process																
8	Account management																
9	Construction chain management																
10	Claims and dispute resolution																
11	Financial audit																

Sr No	Competency Stages	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15
		12	Resource analysis													
13	Computer services															
14	Construction technology															
15	Government regulation law															
16	Arbitration															
17	Expert witness/evidence															
18	Business management															
19	Research and development															
20	Cost information database															
21	Feasibility studies															
22	Life cycle cost analysis															
23	Tax depreciation															

Sr No	Competency	Stages															
		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	
24	Special assessment																
25	Technical audits																
26	Technical due diligence																
27	Compliance issues																
28	Project value management																
29	Project management																
30	Project risk management																
31	Quality assurance																
32	Contract administration																
33	Insurance																
34	Property investment funding.																
35	Development appraisal																
36	Facilities management																

Sr No	Competency Stages	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15
		37	Economic of construction													
38	Personal and Interpersonal															
39	Professional practice															
40	BIM (Building Information Management)															
41	Community management															
42	Property valuation															
43	Handing over the project inventory.															
44	COC Documentation (Certificate of Conformity)															
45	Reporting structure (Material and cost)															

I highly appreciate your contribution to my dissertation. I will be happy to share the outcome of this research with you, if you are interested.

Thank you!