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Expected Competencies of Quantity Surveyors in Zimbabwe

*Tirivavi Moyo[1], Mernard Mukawa[2], Cynthia Moyo[2] and Benviolent Chigara[3]

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Abstract: Complex clients' requirements and numerous construction industry challenges require an interrogation of the quantity surveyor's competencies. This article reports on a study that sought to determine the expected competencies of quantity surveyors and to establish statistically significant differences in ranking due to quantity surveyor designations. A questionnaire survey research design was employed to collect the primary data. Quantity surveyors from all quantity surveying firms and those working for construction companies in the major cities of Harare and Bulawayo in Zimbabwe participated in the study. Eight components were revealed through factor analysis, with the highest ranked component consisting of project finance control and reporting, sustainability issues and conflict avoidance management and dispute resolution procedures. While the traditional competencies of effective financial control and conflict management remain vital, sustainability issues have also become a priority. Hence, continuous professional development programmes and curricula redesigns that cater for these competencies are essential. A statistically significant difference due to the consultants' and contractors' quantity surveyor designations was revealed, indicating a differentiation of their roles. Thus, relevant weighted competency assessment frameworks also need to be instituted. However, owing to the exploratory nature of the study, only views of quantity surveyors were considered.

Keywords: Competencies, Construction, Human capital, Quantity surveyor, Zimbabwe

INTRODUCTION

The construction industry is undeniably essential to the economic growth of developing countries. As the provision of infrastructure and basic amenities is the principal concern, failure to understand context-related quantity surveying competencies is detrimental to the success of development programmes (Mohmad, Othman and Saberi, 2009). Clients' requirements have evolved and become more complex while measured responses to sustainability and innovation challenges are increasingly required (Mhlanga, 2018; Shayan et al., 2019). The plethora of problems facing the construction industry, namely productivity, profitability, performance and sustainability challenges (Chigara and Moyo, 2014a; Mhlanga, 2017; 2018; Simushi and Wium, 2020), health and safety inadequacies (Chigara and Moyo, 2014b; Chazireni and Chagonda, 2018) and decent work concerns (Moyo, Crafford and Emuze, 2019) are considerably resolvable by the development of quantity surveyor

[1]Department of Quantity Surveying, Nelson Mandela University, Gqeberha 6001, SOUTH AFRICA
[2]Department of Construction Economics and Management, National University of Science and Technology, Bulawayo, ZIMBABWE
[3]Department of Construction Management, Nelson Mandela University, Gqeberha 6001, SOUTH AFRICA
*Corresponding author: tirivavimoyo@gmail.com

professional expertise and knowledge (Olanrewaju, 2016). Quantity surveyors are critical for the financial and contractual management of construction projects; however, they are continually confronted with new challenges and opportunities (Dada and Jagboro, 2012). Although the traditional roles of the quantity surveyor are predominant, there is a need for emerging competencies (Crafford and Smallwood, 2007; Shayan et al., 2019). In addition, there is no consensus on the services offered by quantity surveyors in different economies (Olanrewaju, 2016). Furthermore, continuous professional improvement through the determination of novel competencies is non-existent in Zimbabwe. Therefore, the evolution of the nature of construction and the needs of clients necessitate an examination of the roles and responsibilities of quantity surveyors (Nkado, 2000). Moyo, Crafford and Emuze (2018) reported on the need for quantity surveyors to respond to the decent work conundrum through developing their competencies. Thus, the context-related competencies of quantity surveyors are paramount to ensuring the effectiveness and the efficiency in the project delivery (Mohmad, Othman and Saberi, 2009).

Therefore, this study aims to identify the expected competencies of quantity surveyors in Zimbabwe. Adesi, De-Graft and Murphy (2018) revealed the significance of strategic management competency for quantity surveyors to deliver construction projects successfully. Soft skills are also valuable as they support technical skills (Shafie, Khuzzan and Mohyin, 2014). Ramus, Birchall and Griffiths (2008) also reported on the role differences amongst the respective quantity surveyors that work for consultants' and contractors' organisations. For engineering services, contractors' quantity surveyors are reported to offer better cost management expertise advice than consultants' quantity surveyors (Olanrewaju and Anahve, 2015). Therefore, this study considers the consultants' and contractors' quantity surveyors within the designation demography. Zimbabwean quantity surveying professionals' roles have to evolve in their competencies to remain relevant. However, the absence of consensus makes changes difficult (Wanda, Tramontin and Haupt, 2016). Interventions in curricula design, assessment of professional competency and continuing professional development have been suggested and need in-depth consideration (Crafford and Smallwood, 2007). Cumulatively, Akinola (2019) reported that services that are flexible, innovative and internationally focused are vital for quantity surveyors as they enable them to respond appropriately to future challenges and opportunities.

COMPETENCY AND COMPETENCY APPROACHES

Mulder (2014: 108) defined competency as a "coherent cluster of knowledge, skills and attitudes which can be utilised in real performance contexts". Skorkova (2016) described competency as an authority and responsibility emphasising the jurisdiction given to individuals by the external world within various professions. Professional competency is seen as the generic, integrated and internalised capability to deliver sustainable effective performance in a certain professional domain, job, role, organisational context and task situation (Mulder, 2014). These definitions are in agreement with that of PAQS (The Pacific Association of Quantity Surveyors) (2001: 1) of competency as "the ability to perform the activities within an occupation to the standard expected for employment".

The disconnection between education and the labour market led to professional associations' articulating performance requirements and developing competency profiles with which candidates should comply to enter certain professions (Mulder, 2014). In addition, Suhairom et al. (2014) opined that competency modelling should be based on the extensive research aligned to the organisational culture. In Zimbabwe, the absence of adequate research has resulted in the stagnation of the profession in light of worldwide trends. This has contributed to the current construction industry challenges (Mhlanga, 2018; Moyo, Crafford and Emuze, 2019). For example, the Zimbabwe Institute of Quantity Surveyors' (ZIQS) competency testing framework has for some time been restricted to measurement and estimating, professional practice, professional fees, contracts administration and final accounts. On the other hand, neighbouring countries such as South Africa and Botswana have a more comprehensive and modern approach to competency testing frameworks similar to the Royal Institute of Chartered Surveyors (RICS) approach.

Competency and professional and practice-based learning are intrinsically linked (Marrelli, Tondora and Hoge, 2005; Chouhan and Srivastava, 2014; Mulder, 2014). However, various competency approaches exist that include competency and behaviouristic functionalism, competency and integrated occupationalism and competency and situated professionalism. Competency and behaviouristic functionalism stresses the importance of specifically determining the discrepancies between actual and desired competency, leading to the training of sometimes minuscule skills. Competency and integrated occupationalism are visible in the present qualification frameworks and competency-based education approaches in which it is emphasised that knowledge, skills and attitudes should be integrated into the curriculum, teaching, learning and testing while competency and situated professionalism indicates that competency only becomes meaningful in a certain context (Mulder, 2014). The determination of competencies is linked to: (1) the knowledge attained in higher education institutions, (2) knowledge and practical experience and (3) knowledge, practical experience and the capacity to advise (PAQS, 2001; RICS, 2018). Whilst all three have strengths and weaknesses and should be combined in practice, various professions have implemented different approaches (Mulder, 2014). Competency and behaviouristic functionalism has the disadvantage of fragmentising learning whilst competency and situated professionalism is said to cover competency under generic expressions which are not sufficient for professional certification (Mulder, 2011). Competency and integrated occupationalism best suits the quantity surveying profession as also confirmed by the international quantity surveying professional bodies' approach (PAQS, 2001; RICS, 2018). In Zimbabwe, quantity surveying tertiary education is undertaken by five polytechnic colleges and one university. The ZIQS is the professional body responsible for professional membership and ensures competency testing within the profession. Therefore, the relationship between the educational institutions and practice organisations is aligned to the competency and integrated occupationalism approach as supported by Marrelli, Tondora and Hoge (2005). In addition, Serim, Demirbag and Yozgat (2014) supported the implementation of competency models within organisations' human resources practices as it enhances the positive value for the organisation and the profession.

Quantity Surveying Competencies

With the changing construction practices, competencies will inevitably evolve (Hasan et al., 2011). Consideration of global trends to prepare for future competencies is important (Shayan et al., 2019); therefore, the conceptual framework was limited to competencies proffered by the PAQS (2001), the IFS (International Federation of Surveyors) (2018) and the RICS (2018). The IFS (2018) and the RICS (2018) have categorised the competencies required of quantity surveyors as mandatory, core and optional competencies. Mandatory competencies are those that provide a basic skill set for working as a professional; core competencies define the quantity surveyor's skill base and are important for practising; while optional competencies are those that are desired in a quantity surveyor and are also provided at the foundational graduate level (RICS, 2018). However, there are variations in the constituent competencies in these categories. Within the IFS (2018), the competencies are defined at three levels of attainment with 10 mandatory, 6 core and 12 optional competencies. However, the competencies within each category may be of different levels of attainment, as shown in Table 1. This is similar to the RICS (2018) approach, though the differences are in the number of competencies in each group, namely 8 mandatory, 7 core and 10 optional competencies.

Table 1. Competencies from professional bodies

Competency Level	Competency	IFS (2018)	RICS (2018)	PAQS (2001)
M	Ethics, rules of conduct and professionalism	×	×	
M	Client care	×	×	
M	Communication and negotiation	×	×	
M	Health and safety	×	×	
S	Project management			×
(C, M, S, M, M)	Entrepreneurship (Commercial management of construction; Business planning; Business management; Accounting principles and procedures; Budgetary process and account management)	×	×	×
O (O, S, S)	Conflict avoidance management and dispute resolution procedures (Arbitration; Expert witness and evidence; Claims and dispute resolution)	×	×	×
M (S)	Data management (Cost information database)	×	×	×
M	Diversity inclusion and team working	×	×	
C (S)	Contract practice (Due diligence)	×	×	×

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Table 1. (*Continued*)

Competence Level	Competence	IFS (2018)	RICS (2018)	PAQS (2001)
C (S)	Construction technology and environmental services (Constructability and the environment)	×	×	×
C (C, C)	Procurement and tendering (General procurement advice; Tendering process)	×	×	×
C	Project financial control and reporting	×	×	
C (C, S)	Quantification and costing of construction work (Cost estimating; Measurement and statistical analysis)	×	×	×
C (M)	Design economics and cost planning (Cost planning)	×	×	×
O (S)	Building information modelling (BIM) management (Computer services)	×		×
M (O, S, S, S)	Asset management (Capital allowances; Special assessments; Compliance issues; Tax depreciation)	×	×	
O (M)	Contract administration (Contract documentation)	×	×	×
O	Corporate recovery and insolvency	×	×	
(S, S)	Property investment development (Life cycle cost analysis; Compliance issues)			×
O	Insurance	×	×	
O (M)	Programming and planning (Strategic planning)	×	×	×
M (O)	Project feasibility analysis (Project evaluation)	×	×	×
S, C (C)	Research and development (Change management)	×	×	×
O	Sustainability issues	×	×	
S (S)	Auditing (Construction financial audit)			×
(O)	Value management and engineering (Project value management)			×
O (S)	Risk management (Quality assurance)			×

Note: M = Mandatory; C = Core; O = Optional; S = Specialist

Fundamentally, some competencies such as sustainability and conflict avoidance management and dispute resolution procedures are in different competency categories whilst BIM management is found in IFS (2018) and PAQS (2001) but not in RICS (2018). On the other hand, PAQS (2001) has different competency categories, namely 8 basic skills competencies, 10 core competencies and 21 specialist competencies. The basic skills and core competencies' definitions are similar to those of mandatory and core competencies for IFS (2018) and RICS (2018).

However, specialist competencies are considered to be primary business functions (PAQS, 2001). The PAQS (2001) has presented different terminology to that of IFS (2018) and RICS (2018); therefore, in some cases, holistic terms were used to define the competencies collectively.

A plethora of studies on quantity surveyors' competencies exist. However, various approaches have been undertaken and have contributed to specified results and conclusions. A consideration of these studies is important if a robust methodology is to be undertaken. The participants, sources of competencies, data analysis and findings have been interrogated in this section to determine a feasible approach that enhances the validity of the results. The information in Table 2 considers some of the variables under scrutiny as investigated in developing countries.

Table 2. Previous studies on quantity surveying competencies

Author	Participants	Source of Competencies Utilised	Findings
Nkado (2000), South Africa	Registered quantity surveyors and quantity surveyors-in-training members	RICS (1998)	Management oriented competencies identified as important future competencies. These include asset and financial objectives, initiating and sustaining relationships, IT-driven technical competencies and property economics, law and research.
Crafford and Smallwood (2007), South Africa	Clients	RICS (2006) and exploratory phase	Determined five key components: core technical and general management skills, financial planning and control, contract administration, control and decision making and commercial management.
Perera et al. (2007), Malaysia	Quantity surveying academics, quantity surveyors and financial industry experts	RICS (1992), AIQS (Australian Institute of Quantity Surveyors) (1999)	Competencies suitable for technical appraisal that include feasibility studies, resource analysis, quality assurance, project risk management, valuation, estimation and technical evaluation.
Said, Shafiei and Omran (2010), Malaysia	Professional quantity surveyors	RICS (1998), AIQS (1998) and PAQS (2001)	Quantity surveying educators and practitioners are still concentrating on traditional core practices as opposed to required novel services and skills.
Dada and Jagboro (2012), Nigeria	Quantity surveyors, architects, structural engineers and builders	RICS (1998), PAQS (2001) and AIQS (2004)	15 of the 21 competencies were considered important. Expected competencies included cost planning and control, estimating, construction procurement system, contract documentation and contract administration.

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Table 2. (*Continued*)

Author	Participants	Source of Competencies Utilised	Findings
Shafie, Khuzzan and Mohyin (2014), Malaysia	Employers or human resource managers	RICS (2009), Said, Shafiei and Omran (2008) and AIQS (1998)	Expected soft skills competencies for quantity surveying graduates that include critical thinking, problem solving, decision making, communication, language and capability to work independently.
Olanrewaju (2016), Nigeria	Quantity surveyors, engineers and architects	RICS (2014), Ashworth, Hogg and Higgs (2013)	Quantity surveyors need to diversify and meet requirements for other stakeholders. Significant differences with other stakeholders included in competencies of preparation of engineering services, bills of quantities, acting as an adjudicator, preliminary cost planning and advice, cost benefit analysis, project management service and provision of information for use in future management and maintenance of buildings.
Wanda, Tramontin and Haupt (2016), South Africa	Literature review	RICS (1998, 2014), Perera et al. (2007), Shafiei and Said (2008), Parera, Pearson and Dodds (2010), Ashworth, Hogg and Higgs (2013) and Sonson and Kulatunga (2015)	New and evolving of competencies determined; however, a challenge to equipping professionals with "new" competencies was recognised.
Dada (2017), Nigeria	Quantity surveyors, architects, structural engineers, builders and clients	PAQS (2001) and Ogunsemi (2004)	Three significant competencies from 13 variables that include procurement and value management, commercial management and communication and entrepreneurship.
Adesi, De-Graft and Murphy (2018), Ghana	Registered quantity surveyors	Perreault and McCarthy (2002) and Bolton and Alba (2006)	Strategic management competencies that include business management, services cost management and production capabilities were deemed significant for successful project delivery.

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Table 2. (*Continued*)

Author	Participants	Source of Competencies Utilised	Findings
Yusop et al. (2018), Malaysia	Registered quantity surveyors	Fortune and Skitmore (1993; 1994)	Determined key technical skills required of quantity surveyors and this included ability to draw 2D and 3D sketches, difficulty in carrying out quantification, inability to understand construction components and lack of current information technology and software.
Shayan et al. (2019), Malaysia	Construction professionals and quantity surveyors	AIQS (2012), RICS (2015), Cunningham (2014) and Shafie, Khuzzan and Mohyin (2014)	Emerging most important roles of sustainability advisory and BIM ability for cost management.
Chamikara, Perera and Rodrigo (2020), Sri Lanka	Quantity surveyors (contractors', consultants' and clients' organisation)	IQSSL (2015), AIQS (2012) and RICS (2014)	Key competencies for sustainable construction: Value management, Life cycle assessment, Whole life costing, Lean principles and Supply chain management.

In South Africa, Nkado (2000) modelled competencies of individual quantity surveyors based on the registered quantity surveyors and those in training. However, no distinction was examined on the potential differences in competencies of consultant-, contractor- and client-based quantity surveyors. This is despite Ramus, Birchall and Griffiths (2008) indicating likely differences amongst the respective quantity surveying roles. Crafford and Smallwood (2007) utilised the principal component analysis to establish the five key factors, as shown in Table 2. However, quantity surveyors' views relative to those of clients were not utilised as they did not participate in the survey. Wanda, Tramontin and Haupt (2016) utilised previous studies and a comprehensive literature review. However, this was a limitation as concentration on past insights was contrary to the existent evolution of competencies that require cross-sectional time-bound insights. Furthermore, the purpose of the study to contribute to reshape the curricula would have been strengthened by current insights from construction stakeholders.

In Nigeria, Dada and Jagboro (2012) classified competencies as being core or basic, based on insights of various construction professionals. The inclusion of quantity surveyors and allied professionals was undertaken to avoid a biased approach. However, significant differences in insights of the construction professionals relative to quantity surveyors tend to reflect an inaccurate outcome, especially since quantity surveyors know best what their competency requirements are. Olanrewaju (2016) reported on quantity surveying competency gaps from the insights of architects and engineers. While contributions from architects and engineers are commendable, the exclusion of clients was detrimental as these were perceived to be the key drivers for these emerging competency requirements. Dada (2017) only surveyed on the importance of "new" competencies required

by Nigerian quantity surveyors. While the derivation of these new competencies is situational within national contexts, previous studies by Dada and Jagboro (2012) had already presented some of these competencies as being expected of quantity surveyors. Oyewole and Dada (2019) empirically revealed quantity surveyors' inadequacies in BIM skills and suggested training needs for these and other construction professionals.

In Malaysia, Perera et al. (2007) opined that quantity surveyors should continue exploring opportunities beyond the construction industry owing to their multidisciplinary competencies. However, the study only focused on technical appraisal skills for the financial industry even though other diversified paths exist. Although Said, Shafiei and Omran (2010) acknowledged the difference in roles of a consultant's quantity surveyor and a contractor's quantity surveyor, they did not examine significant differences in their insights towards the selected list of competencies. While soft skill competencies were reported for quantity surveying graduates (Shafie, Khuzzan and Mohyin, 2014), there is a fundamental need to determine those that are essential for those already practising in the construction industry. In addition to studying the key technical skills required of quantity surveyors, there is need for improving learning outcomes and performance relationships through adopting innovative learning methodologies that include 3D modelling exposure and learning in workshop environments (Yusop et al., 2018). Shayan et al. (2019) utilised a frequency index to reveal the viewpoints of quantity surveyors and those who manage quantity surveyors. However, the study did not report on any significant differences from the various respondent groups in ascertaining demographic-specific interventions.

In Ghana, when Adesi, De-Graft and Murphy (2018) determined the significant strategic management competencies for pricing consultancy services, clients' perspectives were not considered although they are essential. In Sri Lanka, Chamikara, Perera and Rodrigo (2020) studied the quantity surveyor's competencies necessary for sustainable construction. The results revealed that aspects of sustainable construction are inherent in all the essential competencies of quantity surveyors. Therefore, sustainable construction is fundamental for the emerging roles of quantity surveyors and requires immediate attention in curricula design and continuous professional development. However, this is a testament to the state of affairs in Sri Lanka and may not be as important in other countries.

RESEARCH METHOD

A positivist philosophy was utilised in this exploratory study. Positivism entails working with an observable social reality to produce the law-like generalisations (Saunders, Lewis and Thornhill, 2016). This sought to determine the expected competencies required by quantity surveyors in Zimbabwe. This corresponds well with the phenomena of expected competencies under study. A questionnaire survey research strategy, as supported by Adesi, De-Graft and Murphy (2018), was utilised which entailed the acquisition of quantitative information from both consultants' and contractors' quantity surveyors.

Sampling

Previous related studies utilised various construction stakeholders in their respondent composition (Shafie, Khuzzan and Mohyin, 2014; Shayan et al., 2019; Chamikara, Perera and Rodrigo, 2020); however, the exploratory nature of this study limited respondents to those that utilise the skills. All the 83 construction companies' resident in Harare and Bulawayo and listed in the list of companies of the CIFOZ (Construction Industry Federation of Zimbabwe) (2019) were included in the contractors' quantity surveyor selection. According to the CIFOZ list, more than 90% of the construction companies in Zimbabwe are found in the selected geographical areas. All eight CIFOZ categories (A to H) were approached for participation in the study where Category A companies are the most organisationally and technically competent, as well as being financially stable. The survey managed to collate data from all eight contractor categories represented within the study area with 48.6% of the contractors being in Category A. This is the highest category and such a high representation confirms the validity of the study. Consultants' quantity surveyors in all 22 quantity surveying firms in Zimbabwe were also selected for participation in the study.

Instrument Design

The emailed and self-administered questionnaires comprised two sections. The first section requested demographic information on age, gender, designation, educational levels and work experience while the second section required the respondents to rate the importance of expected quantity surveying competencies where 1 = "Not important", 2 = "Of little importance", 3 = "Somewhat important", 4 = "Important" and 5 = "Very important". As RICS competencies stand out as the most utilised in previous studies in the Africa region (Nkado, 2000; Crafford and Smallwood, 2007; Olanrewaju, 2016; Wanda, Tramontin and Haupt, 2016), as shown in Table 2, all their 25 competencies formed the foundational competencies for this study. However, to limit the number of competencies under study, some of the RICS competencies were grouped with other competencies from the other professional organisations, as shown in Table 1. The other competencies were selected from the IFS (2018) and PAQS (2001) and included BIM management, auditing, value management and engineering, project management, quality assurance and life cycle cost analysis.

Data Analysis

The Statistical Package for Social Science (SPSS) version 24 (with 95% confidence in the results) was used to aid in the determination of important competencies within demographic variables considerations by using inferential statistics (Field, 2014). A Cronbach alpha reliability test was undertaken, which Taherdoost (2016) described as the extent to which the questionnaire provides stable and consistent results and it showed excellent reliability of 0.9.

Factor analysis was utilised to reveal the expected competencies by explaining the interrelationship among a set of observed variables (Benson and Nasser, 1998). Regarding validity, the Kaiser-Meyer-Olkin (KMO) test was utilised to measure the sampling adequacy for conducting factor analysis. A measure

of 0.598 was obtained and was considered as acceptable at > 0.5 (George and Mallery, 2003; Balasundaram, 2009). Associated with this, Bartlett's test for sphericity measures the multivariate normality of the set of distributions. A significant value of 0.000, which was < 0.05, indicated an appropriately multivariate normal and acceptable data for factor analysis (Benson and Nasser, 1998). The principal component analysis with varimax rotation (Kaiser, 1974) was used to extract components from the analysis with those with eigenvalues greater than one being significant and significant loadings of 0.4 and above being stable for utilisation (Guadagnoli and Velicer, 1988). Eigenvalues measure the variance in all variables attributable to that factor; those with values less than one are ignored as being redundant (Balasundaram, 2009). Varimax rotation was used because of its advantage in maximising variance for each factor by enhancing the high loadings and lowering the low loadings (Benson and Nasser, 1998). Although the variable with the highest factor model in each component is supported to contribute the title of each group of components (Balasundaram, 2009), this study utilised titles that were more inclusive of the constituent factors as supported by Crafford and Smallwood (2007) and Dada (2017). Reliability analysis was also undertaken for each component to determine how well the set of variables are related; reliability of > 0.6 was considered acceptable (Benson and Nasser, 1998; Field, 2014). Ranking of the group of competencies was based on factor scores derived from all row and columns, which can be used as an index of all variables (Balasundaram, 2009).

The Shapiro-Wilk test for normality for samples more than 50 was also undertaken and a non-significant result, sig. value of 0.03 which is less than 0.05, indicated that the data was not normally distributed (Ghasemi and Zahediasl, 2012). The result supports the use of non-parametric tests for testing significant differences due to demographic variables. Significant differences due to demographic variables were examined utilising non-parametric tests. Blumberg, Cooper and Schindler (2008) defined the Mann-Whitney U test as a test for comparing the central tendency of two independent samples, in this case, designation. The statistical significance level for all tests is based on a standard value of $p < 0.05$.

RESULTS AND DISCUSSION

This section reports on the profile of respondents as well as results on the importance of expected competencies and factor analysis.

Profile of the Respondents

The response rate for participation was a combined of 48.6%, represented by 51 respondents (14 out of 22 consultants' quantity surveyors and 37 out of 83 contractors' quantity surveyors) from a population size of 105; this was satisfactory and acceptable. It complies with Moser and Kalton's (1971) return rate lower limit of 30% for validity and Baruch's (1999) suggested response rate of 60% with a standard deviation of 20% as a standard norm for populations of professionals. The profile of respondents also shows that 86% of all the respondents are males and 14% are females. Though this may represent a skew in favour of males, it is a reflection of the representation in the construction industry, which is gender-biased towards males (Magwaro-Ndiweni, 2016). Contractors' quantity surveyors at 72% were

the most represented designation with consultants' quantity surveyor at 28%. This was a reflection of the respondents' populations. All the educational levels were well represented in the study, with those with diplomas (33%), degrees (37%) and postgraduate Master of Science (MSc) degrees (30%). These represent competence levels in the Zimbabwean construction industry. Most of the respondents (37%) had between 0 to 5 years of work experience while the least represented range of work experience is more than 15 years, represented by 15% of the respondents. Also included were those with 6 years to 10 years of experience (30%) and 11 years to 15 years of experience (18%). Generally, the work experience results include all the ranges sufficiently and that is relevant towards ascertaining the inclusivity of this study. Cumulatively, all the demographic variables are competently constituted to allow for statistical analysis and validity of the study.

Expected Quantity Surveying Competencies

Eight groups of competencies were extracted from the factor analysis with an eigenvalue of ≥ 1, which explained 75.102% of the total variance with factor loadings ranging from 0.871 to 0.515, as shown in Table 3. The constituent competencies within each component contributed to the title of the group of competencies (Balasundaram, 2009). The reliability analysis revealed acceptable reliability for all the component groups. Each group of competencies is discussed hereafter.

Table 3. Factor analysis results

Factor Score (Rank)	Competency	Component							
		1	2	3	4	5	6	7	8
1.139 (8)	Procurement and project development								
	Data management	0.805							
	Diversity inclusion and team working	0.798							
	Procurement and tendering	0.722							
	Design economics and cost planning	0.644							
	Project feasibility analysis	0.560							
	Programming and planning	0.482							
1.340 (7)	Contracts management, documentation and technology								
	Contract administration		0.823						
	Quantification and costing		0.737						
	Contracts practice		0.632						
	Construction technology and environmental services		0.548						
1.873 (6)	Value, project and commercial management								
	Value management and engineering			0.871					
	Project management			0.766					
	Property investment development			0.699					
	Entrepreneurship			0.685					

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Table 3. (*Continued*)

Factor Score (Rank)	Competency	Component							
		1	2	3	4	5	6	7	8
	Ethics, rules of conduct and professionalism				0.832				
	Corporate recovery and insolvency				0.553				
2.675 (4)	Information and risk management								
	Auditing					0.839			
	BIM management					0.777			
	Insurance					0.425			
2.822 (3)	Research and portfolio management								
	Research and development						0.805		
	Risk management						0.775		
	Asset management						0.519		
3.258 (2)	Stakeholder and welfare management								
	Communication and negotiation							0.825	
	Healthy and safety							0.807	
3.784 (1)	Financial, conflict and sustainability management								
	Project finance control and reporting								0.762
	Sustainability issues								0.536
	Conflict avoidance management and dispute resolution procedures								0.515
	Eigenvalue	8.622	2.574	2.028	1.946	1.746	1.514	1.365	1.234
	Proportion of variance (%)	30.794	9.912	7.241	6.951	6.234	5.408	4.876	4.406
	Cumulative variance (%)	30.794	39.985	47.227	54.178	60.412	65.820	70.696	75.102

Notes: Extraction method = Principal Component Analysis; Rotation method = Varimax with Kaiser; Normalisation = a. Rotation converged in 11 iterations.

Component 1: Procurement and project development

The first component was named "Procurement and project development" and accounts for 8.622 eigenvalues and a variance of 30.794%. The competencies included in this component are "Data management" (sig. = 0.805), "Diversity inclusion and team working" (sig. = 0.798), "Procurement and tendering" (sig. = 0.722), "Design economics and cost planning" (sig. = 0.644), "Project feasibility analysis" (sig. = 0.560) and "Programming and planning" (sig. = 0.482). This was the least ranked component with the lowest factor score of 1.139 and reliability of 0.638. This component group was mostly composed of competencies with a mix of mandatory, core, optional and specialist competencies. Its ranking confirms these competencies as having the most variances amongst the quantity surveyors within their demographic differences. Consequently, any assessment of competency using this component group would require analysis for constituent weighting owing to the designation of respondents. As alluded to by several authors, competencies of data management, diversity inclusion and team working (Adesi, De-Graft and Murphy, 2018), procurement and tendering, design economics and cost planning

(Nkado, 2000; Dada, 2017), project feasibility analysis (Said, Shafiei and Omran, 2010) and programming and planning are all common to PAQS (2001), IFS (2018) and RICS (2018) frameworks. Hence, their importance cannot be underestimated. Of significance is the procurement and tendering competency and its development for Zimbabwean public sector projects where the recently promulgated procurement regulations have introduced competition in the procurement of quantity surveying consultancy services. Dada and Jagboro (2012) and Dada (2017) also revealed the importance of procurement management as a "new" competency expected of quantity surveyors and hence a coordinated effort is required to enhance this competency in local quantity surveyors.

Component 2: Contracts management, documentation and technology

The second component was named "Contracts management, documentation and technology" and accounts for 2.574 eigenvalues and a variance of 9.912%. The competencies included in this component are "Contract administration" (sig. = 0.823), "Quantification and costing" (sig. = 0.737), "Contracts practice" (sig. = 0.632), and "Construction technology and environmental services" (sig. = 0.548). This was the seventh ranked component with a factor score of 1.340 and reliability of 0.799. It is mainly composed of three core competencies with contract administration as an optional competency under the RICS (2018) framework. Although these competencies were considered important, their ranking shows a departure from traditional competencies to new competencies by quantity surveyors in general as alluded to by Wanda, Tramontin and Haupt (2016). Contract administration, quantification and costing and contracts practice are the key assessment competencies under the ZIQS framework and the results show they are less highly regarded compared to other competencies under study, mainly owing to the designation demography. For contracts administration, the blending of knowledge and practice is considered vital to improving quantity surveyors in its competency. Quantity surveyors also expect that improved contracts administration can curtail the project delivery challenges faced by the industry (Kuwaza, 2019), which is consistent with the views of Dada and Jagboro (2012), Olanrewaju (2016) and Shayan et al. (2019). Increased complexity of projects (Shayan et al., 2019) dictates improved and novel contracts administration tools and techniques; although these can only be acquired through structured Continuous Professional Development (CPD) programmes. However, the more traditional competencies of quantification and costing, contracts practice and construction technology and environmental services have not been rendered insignificant as revealed by Dada and Jagboro (2012). Cumulatively, Shayan et al. (2019) and Chamikara, Perera and Rodrigo (2020) suggested the emergence of competencies that can potentially enhance the effectiveness of the roles within this component and these should be considered for operationalisation.

Component 3: Value, project and commercial management

The third component was named "Value, project and commercial management" and accounts for 2.028 eigenvalues and a variance of 7.241%. The competencies included in this component are "Value management and engineering" (sig. = 0.871), "Project management" (sig. = 0.766), "Property investment development"

(sig. = 0.699) and "Entrepreneurship" (sig. = 0.685). This was the sixth ranked component with a factor score of 1.873 and reliability of 0.748. It is mainly composed of specialist competencies under the PAQS (2001) framework. Quantity surveyors regard the specialist competencies as important and expected for their responses to challenges affecting their profession and industry. The results are supported by Dada (2017) who determined significant factors of value management and entrepreneurship. Aspects of project management, as intimated by Adesi, De-Graft and Murphy (2018) have also become paramount. The introduction of postgraduate degrees and diplomas in project management will positively enhance the knowledge requirements of quantity surveyors. Regarding property investment, although not directly alluded to by Wanda, Tramontin and Haupt (2016), challenges of equipping quantity surveyors with such competencies should be resolved. These competencies must be developed into CPD programmes to ensure that they can offer timeous benefits. Failure of this will negatively affect the projects at their initiation phases.

Component 4: Professionalism and corporate recovery

The fourth component was named "Professionalism and corporate recovery" and accounts for 1.946 eigenvalues and a variance of 6.951%. The competencies included in this component are "Ethics, rules of conduct and professionalism" (sig. = 0.832), "Client care" (sig. = 0.696) and "Corporate recovery and insolvency" (sig. = 0.553). This was the fifth ranked component with a factor score of 2.019 and reliability of 0.734. It is mainly composed of two mandatory competencies and one optional competency under the RICS (2018) framework. The ethics, rules of conduct and professionalism competency is one of the most fundamental expectations of the profession as supported by the PAQS (2001), IFS (2018) and RICS (2018) frameworks. Said, Shafiei and Omran (2010) revealed the need to concentrate on novel services and skills; these findings support that contribution concerning the competency of corporate recovery and insolvency. Olanrewaju (2016) supported the significance of client care when the author highlighted the importance of diversifying and meeting the needs of stakeholders. For the corporate recovery and insolvency competency, the ZIQS is encouraged to institute CPD for the advancement of quantity surveyors. The thrust of any remedial action for mandatory competencies is founded in enhancing curricula design in higher education to ensure their efficient delivery, as supported by Nkado (2000).

Component 5: Information and risk management

The fifth component was named "Information and risk management" and accounts for 1.746 eigenvalues and a variance of 6.234%. The competencies included in this component are "Auditing" (sig. = 0.839), "BIM management" (sig. = 0.777) and "Insurance" (sig. = 0.425). This was the fourth ranked component with a factor score of 2.675 and reliability of 0.743. It is mainly composed of two specialist competencies under the PAQS (2001) framework and one core competency under the IFS (2018) framework. These are competencies that are relatively uncommon but do exist in developing countries such as Zimbabwe. However, the respondents determined them to be important for the future of the profession, a view supported by Perera et al. (2007), Yusop et al. (2018), Oyewole and Dada (2019) and Shayan

et al. (2019). CPD is the most efficient approach to bridge the existent gap and the consequent equipping of quantity surveying firms and construction companies with the necessary information technology and software.

Component 6: Research and portfolio management

The sixth component was named "Research and portfolio management" and accounts for 1.514 eigenvalues and a variance of 5.408%. The competencies included in this component are "Research and development" (sig. = 0.805), "Risk management" (sig. = 0.775) and "Asset management" (sig. = 0.519). This was the third ranked component with a factor score of 2.822 and reliability of 0.843. It is mainly composed of two specialist and one core competencies under the PAQS (2001) framework. Nkado (2000) identified research and development as being an important future competency in South Africa. It continues to be important especially in this fast-paced technological era. The limited research in quantity surveying and construction industry-related challenges in Zimbabwe is detrimental to the construction industry professions' advancement. As the evidence shows, the ZIQS and associated higher education institutions have been left behind in terms of advancing the profession in comparison to global trends. The immediate response would be to invest in research and development, and this includes areas of risk management and asset management. Perera et al. (2007), Olanrewaju (2016) and Chamikara, Perera and Rodrigo (2020) supported these competencies as being key to advancing the quantity surveying profession.

Component 7: Stakeholder and welfare management

The seventh component was named "Stakeholder and welfare management" and accounts for 1.365 eigenvalues and a variance of 4.876%. The competencies included in this component are "Communication and negotiation" (sig. = 0.825) and "Health and safety" (sig. = 0.807). This was the second ranked component with a factor score of 3.258 and reliability of 0.783. It is mainly composed of two mandatory competencies under the RICS (2018) framework. Nkado (2000) and Shafie, Khuzzan and Mohyin (2014) supported the emergence of communication and negotiation as a fundamental competency for the quantity surveyor. Improved communication and negotiation are paramount in the construction industry where the client is more knowledgeable and demands value for money (Shafie, Khuzzan and Mohyin, 2014; Dada, 2017). Nkado (2000) alluded to initiating and sustaining relationships as an important competency and this is similar to client care requirements. For health and safety, academic institutions are required to play a more prominent role in equipping students with this competency. Quantity surveyors consider that they can contribute more towards resolving these challenges through appropriate attention and pricing of health and safety. The health and safety expectations of clients in the mining construction industry where considerable construction activities are situated necessitate such consideration (Moyo, Mangore and Chigara, 2014). The increased call to the adherence to the Decent Work Agenda by the International Labour Organisation also supports this emphasis (Moyo, Crafford and Emuze, 2019). Health and safety have stood out in the Zimbabwean construction industry with higher education institutions recently developing it into existing curricula for quantity surveying degree programmes. However, CPDs are necessary to enhance the skills of those already in the industry.

Component 8: Financial, conflict and sustainability management

The eighth component was named "Financial, conflict and sustainability management" and accounts for 1.234 eigenvalues and a variance of 4.406%. The competencies included in this component are "Project finance control and reporting" (sig. = 0.762), "Sustainability issues" (sig. = 0.536) and "Conflict avoidance management and dispute resolution procedures" (sig. = 0.515). This was the highest ranked component with a factor score of 3.784 and reliability of 0.833. It is mainly composed of a core competency under the RICS (2018) framework and a mandatory competency under the IFS (2018) framework. Project finance control and reporting, sustainability issues and conflict avoidance management and dispute resolution procedures have remained paramount owing to the existence of the challenges reported by Chigara and Moyo (2014a), Mhlanga (2017; 2018; 2019) and Moyo, Crafford and Emuze (2018; 2019). Dada and Jagboro (2012) and Crafford and Smallwood (2007) determined project finance control and reporting as being a key competency for the quantity surveyor and this is the case with the Zimbabwean quantity surveyor. Sustainability issues, however, require targeted action both in higher education institutions and CPD. Chamikara, Perera and Rodrigo (2020) reported the need for quantity surveyors to focus their competencies towards achieving sustainable construction; this is confirmed by the respondents.

Significant Differences Due to Designation

The results of the Mann-Whitney U tests show that there was a statistically significant difference in the collective competencies concerning designation (0.004) since their *p*-value was < 0.05. The individual competencies, as shown in Table 4, are subsequently analysed concerning their statistically significant differences.

Table 4. Summary of Mann-Whitney U test results on designations

Competency	Sig.	Designation Mean Ranks	
		Consultant's Quantity Surveyor	Contractor's Quantity Surveyor
Communication and negotiation	0.033	31.75	23.82
Conflict avoidance management and dispute resolution procedures	0.019	33.07	23.32
Construction technology and the environment	0.038	32.29	23.62
Contracts administration	0.046	31.25	24.01
Quantification and costing	0.036	32.00	23.73
Contracts practice	0.001	35.57	22.38
Asset management	0.019	33.32	23.23
Auditing	0.049	32.25	23.64

Competencies of communication and negotiation, conflict avoidance management and dispute resolution procedures, construction technology and the environment, contracts administration, quantification and costing, contracts practice, asset management and auditing show statistically significant differences due to the designations of consultants' and contractors' quantity surveyors. This is consistent with Ramus, Birchall and Griffiths (2008) who highlighted the differences in roles and responsibilities between these two designations. In all cases, consultants' quantity surveyors rated the competencies higher than the ratings of the contractors' quantity surveyors. This indicates that consultants' quantity surveyors are more involved in these competencies. Communication and negotiation is the only mandatory competency and should be emphasised to all students regardless of their intended designation (Dada, 2017). Construction technology and the environment, quantification and costing and contracts practice are core competencies and the practice of consultants' quantity surveyors enables them to emphasise these as compared to contractors' quantity surveyors. Contracts administration, conflict avoidance management and dispute resolution procedures, asset management and auditing are optional and specialist competencies that are purported to likely be carried out by consultants' quantity surveyors. However, studies by Nkado (2000), Crafford and Smallwood (2007), Said, Shafiei and Omran (2010), Dada and Jagboro (2012) and Wanda, Tramontin and Haupt (2016) supported the importance of these competencies for all quantity surveyors. This study supports the assessment for professional frameworks to be weighted appropriately in consideration of agreed designations such as consultants' and contractors' quantity surveyors. This is an extension of the already existent RICS pathways that include different assessments for quantity surveyors involved in academics.

CONCLUSION

The construction industry challenges and increased complexity of projects in Zimbabwe can be resolved by enhancing the quantity surveyors' competencies to align with global trends. This research aimed to determine the expected competencies of quantity surveyors through both univariate and multivariate analysis. The results show that all the selected competencies from IFS, PAQS and RICS are important to enable the quantity surveyor to function fully in the construction and related industries. Factor analysis was used to derive related and significant groups of expected competencies. It generated eight important groups of competencies expected of quantity surveyors in Zimbabwe. These included, in order of importance, financial, conflict and sustainability management, stakeholder and welfare management, research and portfolio management, information and risk management, professionalism and corporate recovery, value, project and commercial management, contracts management, documentation and technology and procurement and project development. Competencies of project finance control and reporting, sustainability issues and conflict avoidance management and dispute resolution procedures are considered to be the most important group of factors. This is especially the case for globally important sustainability issues.

Significant differences due to designation (consultants' and contractors' quantity surveyors) were derived for the aggregated competencies and specifically for competencies of communication and negotiation, conflict, construction technology and the environment, contracts administration, quantification and costing, contracts practice, asset management and auditing. Quantity surveyors working for consultants value these competencies more than those who work for contractors' organisations; thus, highlighting a differentiation of their roles. The presence of traditional competencies of contracts administration and quantification and costing shows a widening gap of roles and an inclination towards differentiated competency testing for the different designations.

The quantity surveying profession in Zimbabwe needs to evolve; firstly, through ensuring that higher education institutions develop curricula that support the expected competencies determined in the study. Secondly, the ZIQS has to institute CPD programme that addresses shortcomings of the expected competencies to equip those that are already in the industry. Thirdly, the assessment for professional competency has to be restructured to cater for the "new" competencies that are expected of quantity surveyors. Fourthly, the assessment for professional competency has to be restructured to create weighted pathways for the consultants' quantity surveyor and contractors' quantity surveyors owing to the statistically significant differences in the ranking of the competencies. Lastly, there is a need for the inclusion of the academic quantity surveyors in the assessment framework, as supported by the RICS pathways. This is premised by the need to enhance the research and development for the continuous advancement of the profession.

The study had limitations in having quantity surveyors as the only respondents; however, this was an exploratory study and their views were important since they know best of what is expected of them. Further studies should incorporate the views of clients and other construction professionals and assess statistically significant differences due to demographic variables. There is also a need to establish a holistic framework for the assessment of the quantity surveyors according to their various levels and designations.

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