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Competencies expected of graduate quantity surveyors working in developing countries

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Abstract

Purpose – Quantity surveying education in Sri Lanka (SL) presently does not appear to be catering to the industry needs indicating that it may not be up to the expected standard. Hence, the purpose of this study is to identify the gap between the competencies of graduate quantity surveyors (QSs) and the competencies that industry in SL expects from them.

Design/methodology/approach – A hybrid approach was used, consisting of desk reviews, expert interviews and a questionnaire survey. A comparative analysis identifying differences between two competency levels was carried out.

Findings – Analysis reveals that competencies of graduate QSs in areas of cost planning, strategic planning, risk management, value management, life cycle cost analysis, sustainability, surveying and levelling, research and development, building surveying and business management are at levels higher than industry needs. However, majority of competencies are at levels lower than industry expectations.

Research limitations/implications – This research was focused only on competencies of QSs who have successfully completed a quantity surveying degree programme accredited by Institute of QSs SL, Royal Institution of Chartered Surveyors, Australian Institute of QSs and Pacific Association of QSs. It excluded non-graduates' competencies as they gain competencies only through work experience.

Practical implications – This study revealed the need for designing quantity surveying degree programmes to cater to industry needs to ensure that graduates from these programmes are acceptable to the industry.

Originality/value – This study made an original contribution to knowledge by identifying the gap that currently exists between industry needs and programme outcomes of quantity surveying degree programmes, which could be invaluable when improving quantity surveying education in SL.

Keywords Construction industry, Competencies, Quantity surveyor

Paper type Research paper

1. Introduction

Although many consider quantity surveying as a profession dealing with only construction cost, it is a profession that can contribute to the success of an entire project in terms of time, cost and quality (Nkado and Meyer, 2001). Quantity surveyors (QSs) add value to the contractual and financial management of construction projects during their pre-construction, construction and post-construction stages (Dada and Jagboro, 2012). According to Ashworth *et al.* (2013), a QS has to ensure that the resources of the construction industry are used to the best advantage of the society by providing, inter alia, financial management of projects and cost consultancy services to clients and designers during the entire construction process of the projects (p. 1). Thus, the QS as a key professional in the construction industry has to be sufficiently competent to ensure the progress of the construction industry.

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QSs in the early days had only to work for the consultant, contractor or the client of a project (Shafiei and Said, 2008). Today, they work as project managers, arbitrators, etc., and are also involved in the insurance, financial, manufacturing, taxation and valuation industries (Hemajith *et al.*, 2007). In future, they may even have to move into entirely new fields such as development appraisal, life cycle costing, sustainable construction management, supply chain management, quality assurance co-ordination (Karunarathna, 2006; Kanewala, 2003) and facilities management (Smith, 2009). Their engagement in these new fields will require from them several competencies to meet the diversified expectations of the industry (Jeyamathan, 2005). The core competencies expected of QSs have been listed by professional bodies to ensure that practising QSs display the highest standards of professional excellence. Several authors have classified the knowledge of construction economics, construction management, construction law and construction technology as competencies required from QSs (Willis and Ashworth, 1987; Perera, 2006; Niroshan, 2012). Construction information technology (IT) and business administration are two new core competencies that will be required of QSs in the future in view of the growing needs of the clients and the changes expected in the profession (Perera, 2006). The acquisition of these competencies can be facilitated by the introduction of software such as Building Information Modelling (BIM), CostX, etc., and the QSs will need to possess considerable IT skills (Zhou *et al.*, 2012; Nagalingam *et al.*, 2013) to be able to use these kinds of software.

In Sri Lanka (SL), as well as overseas and particularly in the middle-eastern region, the demand for QSs is increasing. Many academic institutions in the country have, therefore, started to offer quantity surveying degree programmes to produce versatile quantity surveying graduates. These graduates will need to have the core competencies outlined by professional institutions if they are to obtain full professional status from these institutions. The construction industry which has multidimensional needs expects graduate QSs to contribute to its day-to-day business functions and especially in the case of chartered QSs to contribute to its progress by properly supervising its projects. Quantity surveying education has failed to identify these multidimensional needs of the construction industry often thinking that graduate QSs lack certain important competencies thereby failing to reach the expected standard (Perera *et al.*, 2011). Yet, local QSs are still quite respected within the country because of the standard and quality of their work. However, given the increasing needs and complications of the industry, the QS's role in the industry can considerably change in the near future, requiring the QS to possess a variety of new skills if they are to be successful in their career (Niroshan, 2012). Hence, this study focuses on identifying the competencies that are lacking in today's QSs, to draw the attention of prospective QSs and to inform educational providers.

2. Construction industry

Construction industry is considered as one of the major contributors to the economic growth and development of a country (Khan, 2008). According to Construction Skills Queensland (2012), it is an industry that constructs, deconstructs, reconstructs, renovates, alters, demolishes, relocates, maintains or repairs any type of building, infrastructure facilities and engineering services. Due to its very nature, this industry has become different from other sectors of the economy (Ofori, 1990). Although it has characteristics common to other industries as well, the following features make it radically distinct from others (Hillebrandt, 1984):

- Large size – In any country, the construction industry is the largest of the fragmented industries (Khan, 2008).
- Complexity – Prediction of the future of a construction project is difficult because of factors such as the nature of the site, workforce and contractual relationships making the management of the projects complex (Brandon, 1992).

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- Nature of demand – Construction industry experiences a strong cyclical variation in demand and has derived demand (Finkel, 1997).
- Main client being the government – In SL, approximately 87 per cent of the total contract value per year is owned by the government (Department of Census and Statistics, Sri Lanka, 2009).
- Tailor-made products – Construction industry gets engaged in the isolated production of one-off products by temporary production systems set up for a particular case (Bertelsen and Sacks, 2007).

Globalisation has brought about improvements in the global transport infrastructure and IT, enabling construction services to be carried out in different geographical locations worldwide (Department for Business Innovation and Skills, 2013). Modern industry has therefore realised the need to change its practices and has started using interoperable software such as BIM, which offers collaborative data applications to support the entire lifecycles of projects.

Recent changes in the construction industry along with increased demand for energy efficient automated construction and IT applications require the services of skilled and flexible professionals to sustain the performance and competitiveness of the industry (Department for Business Innovation and Skills, 2013). If there are important competencies lacking in these professionals, the result can be high costs, time lags, inefficiency and lost businesses. Hence, it is crucial to ensure a close liaison between industry and educational institutions to ensure that the curricular of degree programmes offered by these educational institutions is continually updated to meet the continuously changing skill needs of QSs (St Andrews Management Institute, 2008).

3. Quantity surveying profession

Jayalath (2013, para. 1) defined the QS as the cost and financial accountant of the construction industry. In the past, QSs have been dealing with only financial aspects of projects. The evolving role of the QS has made these past descriptions of quantity surveying outdated. Brandon (1992) defined quantity surveying as an amalgamation of several disciplines within the unique context of the built environment. Before accepting this description of quantity surveying, it needs to be ascertained whether quantity surveying could be confined only to the built environment. Quantity surveying can also be described as a fusion of several fields, e.g. economics, law, accountancy, management, measurement, IT and construction technology, which makes its contribution to all sectors of the economy. Irrespective of what the roles and duties of its practitioners are, the ultimate objective of the profession should be to ensure that its clients receive optimum value for the money they spend.

3.1 Roles and duties of the quantity surveyors

QSs were earlier employed by consultants, contractors and clients (Yogeshwaran *et al.*, 2014). They have now extended into sectors such as insurance, finance, manufacturing, taxation, valuation (Hemajith *et al.*, 2007), petro chemical, mining, aeronautical, shipping and transport (Smith, 2004). As the quantity surveying profession matures, the traditional roles and duties of QSs will need to become more contemporary. Jeyamathan (2005) classified the duties of QSs according to the roles they play in the different phases of a project. Willis and Ashworth (1987) while stating that QSs will be involved with a project throughout its implementation mentioned two types of duties, i.e. traditional and non-

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traditional. Fanous and Mullins (2012) categorised the duties of QSs as traditional duties, evolved duties and emerging duties. Risk management, quality management, feasibility studies, taxation advice, expert witness/appraisal, value management (Crafford and Smallwood, 2007; Smith, 2004); Lee and Hogg, 2009), premises audit and post occupancy evaluation (Chong *et al.*, 2012) could be included under emerging duties. The duties of QSs nowadays include the use of sophisticated technologies as well, which enable them to offer "value-added" professional services (Smith, 2004). QSs need to keep pace with technological advancements otherwise they will fail to meet the industry's needs and might become less important in virtual project teams of the future.

3.2 Professional education of quantity surveyors

Professional bodies such as Royal Institution of Chartered Surveyors (RICS), Australian Institute of QSs (AIQS), Pacific Association of QSs (PAQS) and Institute of QSs SL (IQSSL) have expressly defined pathways to ensure that their members are competent to practice quantity surveying and that chartered QSs meet the high standards of professionalism expected from them. To become a chartered quantity surveyor (QS), a QS graduate has to attain and demonstrate these competencies [Royal Institution of Chartered Surveyors (RICS), 2015]. These are a combination of technical, professional, interpersonal, business and management skills. Based on their importance, these competencies can be grouped under two categories, i.e. mandatory competencies and technical competencies. They can also be classified on the basis of their importance as Level 1, Level 2 and Level 3 competencies where Level 1 is the most important.

The requirements to become eligible to apply for the membership of these professional bodies will depend on the background of the graduates. These requirements as specified by RICS, IQSSL and AIQS for graduates of programmes accredited by IQSSL, RICS, AIQS and PAQS are as follows:

- RICS – A minimum of 24 months of structured training, the duration of which will depend on the relevant experience obtained working under the supervision of a chartered QS. A final assessment submission, interview and the completion of the RICS ethics module would also be necessary [Royal Institution of Chartered Surveyors (RICS), 2015].
- IQSSL – Two years of diary in an approved employment under the supervision of a chartered QS. Professional competence will be assessed through a viva-voce [Institute of Quantity Surveyors Sri Lanka (IQSSL), 2015].
- AIQS – Graduates have to be nominated by a member, associate or fellow of good standing. The graduate has to have a minimum of two years' experience under approved supervision or three years of experience with non-approved supervision, and the successful completion of a member grade assessment of professional competence along with a completed code of conduct topic from the AIQS Academy [Australian Institute of Quantity Surveyors (AIQS), 2015].

The membership assessment processes are based on the development of skills and competencies of QSs.

4. Skills and competencies of quantity surveyors

4.1 Skills

Dada and Jagboro (2012, p. 1) defined "skill" as a proficiency or ability acquired or developed through training or experience. RICS (as cited in Badu and Amoah, 2004) stated that a QS

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should possess skills in the fields of management, documentation, analysis, appraisal, quantification, synthesis, communication, construction cost and price forecasting, procurement advice and contract administration. These skills are essential for QSs if they are to gain competence and survive in a maturing industry.

4.2 Competencies

Shafiei and Said (2008, p. 20) defined "competency" as a set of skills that an individual has to possess to satisfactorily perform a specified job. Quantity surveying practitioners have to constantly face challenges and new opportunities and are therefore required to have distinct competencies to excel in their field. As these competencies have been defined in a multiplicity of perspectives (Nkado and Meyer, 2001), they need to be clearly identified. Although they have been listed by the professional bodies regulating the profession, the levels of competencies that have to be achieved by graduate QSs have so far not been defined. At present, they are ascertained through the core competencies outlined by the governing professional bodies (Perera *et al.*, 2011).

4.3 Professional associations governing the quantity surveying profession in the country

Quantity surveying in SL is governed, influenced and heavily interacted by four main professional associations, namely IQSSL, RICS, AIQS and PAQS. These professional bodies ensure that practising QSs maintain the highest standards of professional excellence [Australian Institute of Quantity Surveyors (AIQS), 2012; Royal Institution of Chartered Surveyors (RICS), 2014]. This, they achieve, by restricting their membership to only those who have educational qualifications acceptable to them along with the required level of professional competence gained from a specified work experience. These professional associations also govern the calibre of quantity surveying education by accrediting quantity surveying degree programmes which meet the standards set out by them (AIQS, 2012). This accreditation of degree programmes will also ensure the quality of those who are graduates of accredited degree programmes.

5. Quantity surveying in Sri Lanka at present and in future

5.1 Current status of the quantity surveying profession in Sri Lanka

The construction industry in SL still uses traditional quantity surveying practices (Fanous and Mullins, 2012) which rely on simple software such as Ms Excel, Ms Word and Auto CAD for its day-to-day routine tasks. It has still not embraced the modern practices which use software such as BIM, Primavera, Revit Architecture and CostX to automate all QS functions. Hence, the expectations of the construction industry and the programme outcomes of QS degree programmes need to be aligned with each other to ensure the successful transfer of new industry graduates (Perera *et al.*, 2011).

5.2 Future of the quantity surveying profession

According to Murphy (2011), future QSs will be required to perform property related management consultancy roles. They will also be required to move into other sectors without confining themselves to the construction industry (Smith, 2004; Hemajith *et al.*, 2007; Olanipekun *et al.*, 2013; Stanley and Thurnell, 2014). The construction industry in the future too will require them to go beyond their traditional duties and become involved in whole life costing, sustainability, facilities management, investment appraisal and value management, which will require them to have considerable IT skills (Sacks and Pikas, 2013; Higham and Thomson, 2015; Wao and Flood, 2016).

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5.3 Threats faced by quantity surveyors

A major threat faced by the quantity surveying profession today is the growing discontent that the industry expresses with the competencies of current graduates (Perera *et al.*, 2010). The industry is also concerned about the mismatch that exists between graduate attributes and industry requirements. Industry views graduates as lacking in knowledge in construction technology and in the understanding of on-site conditions (Perera *et al.*, 2010). At present, only little preference is given to management-oriented competencies. However, according to a study carried out by Nkado (2000), it may not be so in the future. With the emerging developments of technology, it would also be possible to automate almost all of the quantity surveying roles although it has still not become popular in the construction industry in SL. The following also could contribute to the decreasing demand that exists for local QSs:

- lack of soft skills and attitudes (Zakaria *et al.*, 2006);
- provision of quantity surveying services by non-construction related personnel (Chandrasiri, 2010); and
- increased number of institutions in the country offering quantity surveying education which creates a surplus of graduates in the market and involvement of foreign professionals in local projects.

The decrease in opportunities available for QSs in SL can be regarded as a threat to the profession (Chandrasiri, 2010).

6. Importance of identifying the competencies expected of graduate quantity surveyors

Graduate QSs acquire competencies from their formal university education and from their workplace training. However, in the absence of competency-level benchmarking, a mismatch exists between the expectations that the construction industry has about the competencies of quantity surveying graduates and the actual competencies of these graduates. This has made the industry dissatisfied with the competencies of present-day quantity surveying graduates (Perera *et al.*, 2011).

The competencies expected from graduate QSs are being pulled in different directions by the industry and the educational institutions. The industry expects graduate QSs it employs, to become directly involved in all quantity surveying functions and contribute to the growth of the industry. It does not recognise the fact that graduates have the potential to develop their professional skills once they get employed. On the other hand, the focus of the educational institutions is on producing versatile graduates with foundation knowledge in all aspects of the profession together with the capability for further developing that knowledge experientially. Educational institutions believe that their graduates need to possess only the competencies outlined by the regulatory bodies and thus are less interested in giving due consideration to the opposing needs of industry and this means that certain competencies expected by the industry are absent in graduates produced (Perera *et al.*, 2010).

Although some studies have been done on the competencies of graduate QSs, none of them have explored the competencies required from those working in developing countries, especially in SL. Hence, there is a literature gap on this subject.

As identified from the literature review, the role of QSs in the construction industry in the future may differ from what it is today. In addition, the quantity surveying profession will step into many other industries in the future, without confining itself to only the construction industry. All these changes that may occur in the profession in time to come will require future graduates to possess new and diverse skills to be able to successfully carry out the duties

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expected from them by the industry. Hence, there is an imminent need to identify the competencies expected from graduate QSs by the industry, to develop them in future.

7. Data and methods

Competencies of QS graduates were identified by analysing quantity surveying competency standards published by professional bodies and the curriculum of a quantity surveying degree programme that has been accredited by these same bodies. The first part of the research was two desk reviews (i.e. analysis of information already recorded). By continuing the desk reviews prior to the primary research, the research question could be clarified and the focus of the large-scale primary research could be aligned to it (Prescott, 2008).

The second part of the research identified competencies of quantity surveying graduates not up to the required levels. Thus, it required the collection of factual information from practising QSs about the competencies they expect from graduate QSs. As the desk reviews provided the basis for data collection (from the industry), it was not necessary to analyse the research problem in detail during this second part. Quantitative research approach was therefore considered suitable for collecting primary data. Data collection adopted a mixed approach by combining quantitative and qualitative methods.

7.1 Qualitative approach

The two desk reviews already stated were carried out separately. The external desk review studied the competency standards set out by professional bodies such as IQSSL, RICS, AIQS and PAQS which were later tabulated. The internal desk review studied the quantity surveying degree programme that has been accredited by IQSSL, RICS, AIQS and PAQS, to identify graduate QSs' competencies. Thematic analysis was used to analyse those data collected through desk reviews. It is a method used to handle data that assist in identifying, analysing and reporting patterns within it (Braun and Clarke, 2006) and is considered appropriate to any study that intends to make interpretations by offering a systematic element for data analysis (Alhojailan and Ibrahim, 2012). As it does not confuse theoretical knowledge, it is considered as theoretically flexible in comparison to other qualitative approaches.

7.2 Quantitative approach

Desk review findings were validated by three senior experts, all of whom had been involved for more than 15 years with an accredited quantity surveying degree programme. The questionnaire survey was carried out among industry practitioners selected using the convenience sampling method. The questionnaire was of the mixed type containing both open-ended and closed questions. The fixed-type questions were ranked based on a Likert-type scale, a technique used to gauge the different attitudes of respondents towards a statement by asking each respondent to indicate agreement or disagreement with a series of short statements on a given range of responses. The Likert scale used in this research had a range from 0 to 5.

8. Analysis

8.1 External desk review – identification of competencies required from graduate quantity surveyors

The identification of the competencies required from graduate QSs were as follows:

- *IQSSL competencies*. IQSSL is the only professional organisation in SL that has set out competency standards for QSs. It focuses generally on areas related to quantity surveying along with targeted achievements. It is in line with the AIQS competency standard.

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- *RICS competencies.* RICS competencies are categorised under three groups: mandatory, core and optional. This categorisation which is based on their significance to the profession is considered under the following three levels of attainment: Level 1 – knowledge and understanding (knowing); Level 2 – application of knowledge and understanding (doing); Level 3 – reasoned advice and depth of technical knowledge (advising).
- *AIQS competencies.* [Australian Institute of Quantity Surveyors (AIQS), 1997] clusters competencies implicit into competency units each of which describes a particular element of a QS's role in terms of performance criteria, range indicators and evidence guides. These units are again classified as core and specialist units with core units representing competencies that are considered as compulsory for QSs and specialist units describing the functions that can be performed both by QSs and other construction professionals and which require a level of proficiency beyond what can be gained from a quantity surveying degree programme.
- *PAQS competencies.* PAQS competencies are categorised as core and specialist competencies similar to AIQS competencies but are more abbreviated.

8.2 Thematic analysis

Data gathered from the four professional associations mentioned above were separately tabulated to aid analysis and to facilitate thematic analysis process.

First, initial ideas were noted down to make the analysis more comfortable. Data relevant to the research question were then weighed using a manual coding system. The competencies common to all four standards were identified and the competencies which cannot stand on their own were included under other competencies. The competencies were then tabulated to identify the themes relevant to them. As an example, "Data management" in "RICS competencies", "Cost information database" in AIQS and PAQS competencies and "Preparation of cost analysis" in IQSSL competencies could be included under the common heading – "Managing cost data" – as they all carry the same meaning. In Table I, the themes that can be identified for the IQSSL, RICS, AIQS and PAQS competencies are presented. These themes were developed on the basis of the studies done by Willis and Ashworth (1987), Perera (2006) and Niroshan (2012) who categorised such competencies under four groups, namely, Construction Economics, Construction Management, Construction Law and Construction Technology. Perera (2006) stated that IT and Business Administration should also be included among the competencies. Thus, the themes – "Construction Economics", "Construction Technology", "Construction Management", "Construction Law", "Construction IT" and "Business Administration" – were chosen for this research.

The common codes identified during Step 2 and those data that refer to the same aspect were subsequently combined to identify the themes. The six themes identified were further refined in two stages to ensure that coded data formed a consistent pattern and that when a coherent pattern is formed, the themes matched the data set as a whole. Further coding was carried out to confirm that no codes were left out. Finally, themes were defined and designated as represented in Figure 1.

8.3 Internal desk review – identification of the competencies of graduate quantity surveyors

The internal desk review which involved the identification of the competencies of graduate QSs was also done using the thematic analysis described above. Figure 2 represents the findings.

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	Competency	Element
1	Cost planning	Analysing alternative design solutions
		Cost controlling during the design
		Preparing cost plans
		Auditing the scope
2	Cost estimating	Managing cost data
		Preparing estimates
		Reviewing and evaluating estimates
3	Strategic planning	Preparing cost benefit analysis
		Preparing project brief
		Analysing economic and financial issues
		Carrying out development appraisal
		Studying compliance and management
4	Contract administration	Progressive financial monitoring, reporting and controlling during construction
		Recommending progress payments/interim valuation
		Managing claims
		Managing variations
		Preparing correspondence
		Preparing and reporting final accounts
		Managing cash flow during construction
		Administering insurance claims
		Administering, managing subcontracts and controlling subcontract accounts
		Interpreting contractual terms and conditions
5	Dispute resolution	Resolving disputes
6	Contract documentation	Establishing client requirements
		Taking measurements
		Preparing BOQs
		Developing resource management plans
7	General procurement advice	Reviewing procurement systems
		Reviewing forms of contract, subcontracts etc.
8	Tendering process	Managing pre-qualification
		Managing tendering process
		Preparing tender documentation
		Selecting tenderers
		Evaluating and negotiating tenders and awarding same
		Writing specifications
9	Government law and regulation	Knowledge of law, regulations and guidelines related to construction
10	Construction technology	Knowledge of construction technologies, process and building materials
		Knowledge of design principals
		Knowledge of principals of construction
		Interpreting drawings, specifications and other documents
		Designing and installing services
11	Resource analysis	Analysing and managing resources
12	Project management	Pre-contract planning and programming
		Programme monitoring
13	Risk management	Managing risk
14	Value management	Providing value management services
15	Life cycle cost analysis	Analysing life cycle costs

(*continued*)

Table I.
Combined list of IQSSL, RICS, AIQS and PAQS competencies

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	Competency	Element
16	Budgetary process	Establishing budgets Coordinating client's cash flow Assisting the client in financial controlling
17	Financial audit	Knowledge of accounting principles, cash flow, cost reconciliation
18	Ethics and professional conduct	Professional practice
19	Feasibility study	Carrying out feasibility studies
20	Health and safety	Knowledge of health and safety requirements in construction
21	Capital allowance	Capital allowance
22	Corporate recovery and insolvency	Corporate recovery and insolvency
23	Support competencies	Computer services Team work Due diligence Leadership Managing people Communication and presentation skills Client care Economics Statistical Analysis
24	Sustainability	Knowledge of the impact of sustainability in construction
25	Tax depreciation	Tax depreciation
26	Special assessment	Special assessment
27	Quality assurance	Quality assurance
28	Expert witness	Expert witness
29	Business management	Business management
30	Research and development	Research and development

Table I.

8.4 Expert validation

Findings of the internal and external desk reviews had to be slightly amended to accommodate the changes proposed by the experts at the interviews. For example, financial auditing and technical auditing had to be identified separately. Business administration had to have both mandatory and optional competencies. Teamwork, leadership, managing people, communication and presentation skills and client care had to be made mandatory with the rest kept as optional. The experts were of the view that learning outcomes do not come under one specific competency. It was therefore decided to include each learning outcome under more than one competency.

8.5 Identification of the competency levels of graduate quantity surveyors

Competency levels of graduate QSs were identified using Bloom's Taxonomy, which considers graduate QSs as individuals who have to maintain a diary to record their work experience for assessing their professional competencies when they apply to become chartered QSs. It is a theory used to design instructions or learning processes (Munzenmaier and Rubin, 2013). It addresses three domains of educational activities – cognitive, affective and psychomotor. In this research, the cognitive domain which involves knowledge and development of intellectual attitudes and skills was considered to determine the competency levels of graduate QSs. The curriculum was analysed using the original Bloom's Taxonomy

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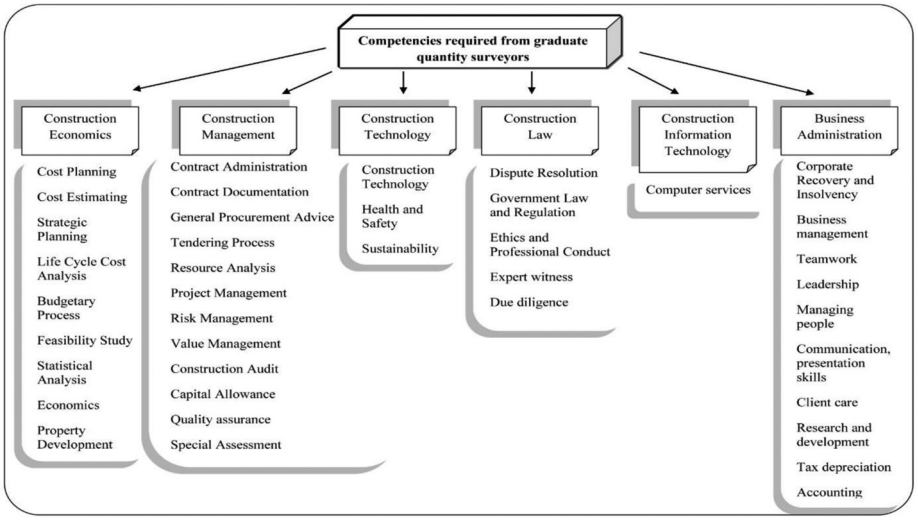

Figure 1.
Competencies required from graduate QSs (findings of the external desk review)

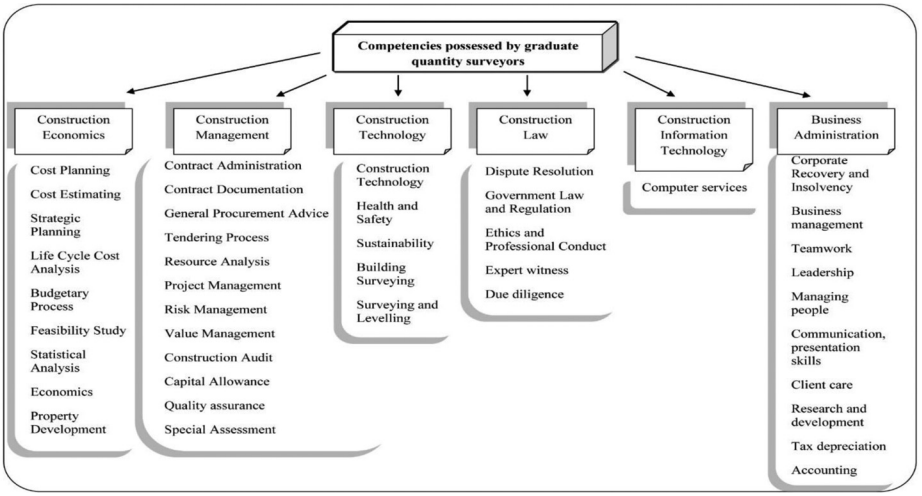

Figure 2.
Competencies possessed by graduate QSs (findings of the internal desk review)

by assigning each category in the taxonomy with a score depending on the chronological order of attainment. Accordingly, Scores 1, 2, 3, 4, 5 and 6 were given to knowledge, comprehension, application, analysis, synthesis and evaluation, respectively. Afterwards, by referring to Bloom's Taxonomy, each learning outcome in the curriculum was assigned a level based on the type of the verb used. The outcome indicates that graduates do not have the competencies – capital allowance, corporate recovery and insolvency and special assessment. The competencies, cost planning, risk management, value management, research and development, strategic planning, ethics and professional conduct and life cycle cost analysis, are found to be in existence at a higher level.

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8.6 Questionnaire survey analysis

The questionnaire survey dealt with several important perspectives to enable a comparative analysis between the competency levels expected from graduate QSs and the competency levels they actually possessed. Based on the results, differences between the two competency levels were tabulated and a comparative analysis undertaken based on the themes generated through the thematic analysis described earlier.

Results indicate that despite industry expectations, the curriculum of the quantity surveying degree programme studied does not address the competencies – capital allowance, corporate recovery and insolvency and special assessment. The standard deviation (SD) of the responses in respect of each of these three competencies was slightly higher indicating that their combined responses were more dispersed. The reason for this may be because the tasks concerned being not core competencies but only specialised or optional competencies rarely required from QSs are not being handled exclusively by QSs.

Another finding is that most competencies expected are at levels greater than those possessed by graduate QSs. Cost estimating, contract administration, contract documentation, government law and regulation, construction technology, resource analysis, project management, budgetary process, ethics and professional conduct, support competencies and construction audit are the competencies which are often required from graduate QSs and there is a large positive gap (>1) between the two levels. The competencies tendering process, general procurement advice and quality assurance have a small positive gap (<1). Dispute resolution, tax depreciation, expert witness, feasibility study and health and safety, though having a positive gap, are not always expected from graduate QSs. This is demonstrated by the high SD of these competencies. There are also competencies of graduate QSs which are at a higher level than the levels expected by the industry. Those are cost planning, strategic planning, risk management, value management, life cycle cost analysis, sustainability, business management, research and development, building surveying and surveying and levelling. Table I indicates the gaps between the two levels of competencies (Table II).

When the above competencies are grouped under the themes developed via thematic analysis, the expected level of competencies under each theme are as shown in Table III.

Figure 3 presents the results of the comparative analysis, categorised according to said themes. It shows that under each theme, the level of competencies possessed by graduate QSs is less than the levels expected by the industry. Competencies such as construction IT and construction management have a high positive gap between the two levels. Though business administration is not a core area handled by QSs, there is a comparatively high level of expectation in this area. The reason for this could be that it requires some crucial support competencies such as teamwork, leadership, communication and presentation skills and client care, all of which are essentially required from QSs. The gap between the two levels of the theme "construction technology", though positive, is not significant because this comprises competencies such as building surveying, surveying and levelling and health and safety, which are seldom required from QSs and which are in addition to the competency "knowledge of construction technology".

9. Concluding discussion

Educational institutions and industry have different expectations concerning the competencies required of QSs. Industry, in particular, expects graduates to improve their performance by going beyond the confines of the curriculum of their degree programme and making themselves available for future improvements. The quantity surveying educational

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Competency	Expected level	Possessed level	Gap
Cost planning	4.8	5.00	−0.2
Cost estimating	6.0	4.36	1.6
Strategic planning	3.8	5.08	−1.2
Contract administration	5.9	3.81	2.1
Dispute resolution	3.9	3.69	0.2
Contract documentation	5.4	3.61	1.8
General procurement advice	4.8	3.97	0.8
Tendering process	5.4	4.66	0.7
Government law and regulation	4.8	2.91	1.9
Construction technology	5.5	2.78	2.7
Resource analysis	4.8	3.00	1.8
Project management	4.8	3.50	1.3
Risk management	4.8	5.00	−0.2
Value management	4.8	5.00	−0.2
Life cycle cost analysis	4.8	6.00	−1.2
Budgetary process	4.8	3.57	1.2
Accounting principles and procedures	3.6	3.60	0.0
Ethics and professional conduct	6.0	4.25	1.8
Feasibility study	4.8	4.70	0.1
Health and safety	2.4	2.00	0.4
Capital allowance	3.6	0.00	3.6
Corporate recovery and insolvency	3.6	0.00	3.6
Support competencies	5.3	2.53	2.7
Sustainability	2.4	3.50	−1.1
Tax depreciation	3.0	2.00	1.0
Special assessment	2.4	0.00	2.4
Quality assurance	3.6	3.00	0.6
Expert witness	2.4	2.00	0.4
Business management	2.4	2.88	−0.5
Research and development	3.6	5.00	−1.4
Construction audit	4.8	3.87	0.9
Property development	3.0	3.00	0.0
Building surveying	3.0	3.63	−0.6
Surveying and levelling	2.4	2.60	−0.2

Table II.
Gaps between the levels of competencies expected and possessed

institutions, on the other hand, focus on producing graduates who will be able to cater only to present-day needs. New opportunities and developments in the industry reinforce the need to upgrade the competencies of graduate QSs to prepare them to face the threats and challenges of the industry.

Competencies required from graduate QSs were categorised under 30 topics in the external desk review, which were then grouped under six themes, viz., "Construction Economics", "Construction Technology", "Construction Management", "Construction Law", "Construction IT" and "Business Administration", to obtain a broader perspective. The internal desk review which analysed the curriculum of the quantity surveying degree programme accredited by several leading professional organisations indicated that all the required competencies, except capital allowance, corporate recovery and insolvency and special assessment, are possessed by graduates. They also have competencies in building surveying, surveying and levelling and property development which are not expected by professional organisations.

The curriculum analysis done using Bloom's Taxonomy revealed that the competencies cost planning, risk management, value management, research and development, strategic

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Theme	Competency	Expected level (Median)	Expected level – Theme
Construction economics	Cost planning	4.80	4.63
	Cost estimating	6.00	
	Strategic planning	3.84	
	Life cycle cost analysis	4.80	
	Budgetary process	4.80	
	Feasibility study	4.80	
	Statistical analysis	4.80	
	Property development	3.00	
	Economics	4.80	
Construction management	Contract administration	5.88	4.59
	Contract documentation	5.40	
	General procurement advice	4.80	
	Tendering process	5.40	
	Resource analysis	4.80	
	Project management	4.80	
	Risk management	4.80	
	Value management	4.80	
	Construction audit	4.80	
	Capital allowance	3.60	
	Special assessment	2.40	
	Quality assurance	3.60	
Construction technology	Construction technology	5.28	3.10
	Health and safety	2.40	
	Sustainability	2.40	
	Building surveying	3.00	
	Surveying and levelling	2.40	
Construction law	Dispute resolution	3.90	4.38
	Government law and regulation	4.80	
	Ethics and professional conduct	6.00	
	Expert witness	2.40	
	Due diligence	4.8	
Construction IT	Computer services	5.4	5.40
Business administration	Corporate recovery and insolvency	3.60	4.38
	Business management	2.40	
	Research and development	3.60	
	Accounting principles and procedures	3.60	
	Tax depreciation	3.00	
	Teamwork	6.00	
	Leadership	4.80	
	Managing people	4.80	
	Communication and presentation skills	6.00	
	Client care	6.00	

Table III.
Theme categorisation of expected level of competencies

planning, ethics and professional conduct and life cycle cost analysis were possessed by graduates at higher levels. The competencies health and safety, tax depreciation and expert witness were at lower levels.

The implicit survey revealed that ethics and professional conduct, construction technology, contract documentation, tendering process, contract administration, cost estimating and support are expected by the industry at very high levels. Construction IT, construction management and construction economics have high expectation levels.

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Health and safety, sustainability, special assessment, expert witness, business management and surveying and levelling are expected at low levels.

The comparative analysis carried out on the competency levels expected from and possessed by the graduates found that most of the graduate competencies are at levels lower than those expected by industry. Cost planning, strategic planning, risk management, value management, life cycle cost analysis, sustainability, business management, research and development, building surveying and surveying and levelling are at levels higher than the expected levels. The expected levels are in general, higher than the possessed levels. The remaining competencies are identified as competencies that are sub-standard.

This study assumed that quantity surveying education must cater to industry needs, to produce graduates who can face competition from their colleagues and meet industry expectations. Therefore, national and international professional organisations should focus on and develop a qualitative system which can indicate the level of competencies required from their graduates. This system should be practicable and applicable for use by educational institutions when they evaluate their degree programmes. In addition, quantity surveying educational systems should be reviewed and revised to enable them to meet industry expectations, by ensuring that all expected competencies are sufficiently addressed in their respective curricular. Priority must be given to modules associated with construction IT and evolving fields such as BIM and sustainability. This particular suggestion has been echoed in recently published RICS Assessment of Professional Competence (APC) Guide (2017, August). As specified in the APC Guide, BIM has now become one of the core technical competencies, pre-requisite to chartered status. This competency generally expects a QS to be able to establish and manage information modelling systems in construction projects. The RICS APC Guide (2017) also states that a chartered QS must be familiar with and be able to merge and understand the collaborative nature of the BIM and the technological approach in BIM within the scope of the construction projects. Graham (2016) elaborated that core functions and duties of QSs have to be inspired by BIM stating that BIM upgrades current technology and also the types of software that are used in QS offices.

10. Limitations of the study

The research was limited to those competencies that can be attained through graduate courses of studies accredited by IQSSL, RICS, AIQS and PAQS. It did not consider competencies that can be attained through work experience. Graduate QSs identified in this study are those who are sufficiently qualified to maintain work experience diaries to enable the assessment of their professional competencies when they apply to become chartered QSs or the QSs who are working under the supervision of a chartered QS.

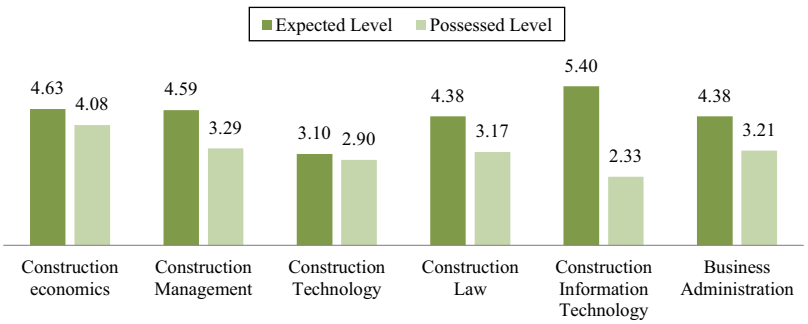

Figure 3.
Comparative analysis based on themes

المنارة للاستشارات
www.

References

Alhojailan and Ibrahim, M. (2012), "Thematic analysis: a critical review of its process and evaluation", *Proceedings of the WEI International European Academic Conference*, pp. 8-21, available at: www.westeastinstitute.com/wp-content/uploads/2012/10/ZG12-191-Mohammed-Ibrahim-Alhojailan-Full-Paper.pdf (accessed 10 August 2014).

Ashworth, A., Hogg, K. and Higgs, C. (2013), *Willis's Practice and Procedure for the Quantity Surveyor*, Wiley, Hoboken.

Australian Institute of Quantity Surveyors (AIQS) (2012), "National competency standards for quantity surveyors – construction economists", (ISBN 1-876389-02-8).

Australian Institute of Quantity Surveyors (AIQS) (2015), "Membership centre", available at: www.aiqs.com.au/imis/AIQS_Website/Membership_Centre/Member_Grade/AIQS_Website/Public/Membership_information/Member_Grade.aspx?hkey=dd88d2c8-6f1e-4ee8-90ca-67a99c50c32d (accessed 2 July 2016).

Australian Institute of Quantity Surveyors (AIQS) (1997), "National competency standards for quantity surveyors – construction economists", (ISBN 1-876389-02-8).

Badu, E. and Amoah, P. (2004), "Quantity surveying education in Ghana", *The Ghana Engineer*, pp. 1-12. available at: www.icoste.org/GhanaEdu.pdf (accessed 18 May 2014).

Bertelsen, S. and Sacks, R. (2007), "Towards a new understanding of the construction industry and the nature of its production", *Proceedings of the IGLC*, pp. 46-56, available at: http://prosjekt.uia.no/uwc/wp-content/uploads/2011/11/Bertelsen-S.-and-Sacks-R.-2007.-Towards-a-new-Understanding-of-the-Construction-Industry-and-the-Nature-of-its-Production.pdf (accessed 3 May 2014).

Brandon, P.S. (1992), *Quantity Surveying Techniques: New Directions*, Blackwell Scientific Publications, Hoboken, NJ.

Braun, V. and Clarke, V. (2006), "Using thematic analysis in psychology", *Qualitative Research in Psychology*, Vol. 3 No. 2, pp. 77-101.

Chandrasiri, R. (2010), "Challenges facing the establishment of the quantity surveying profession in Sri Lanka", *SLQS Journal*, pp. 24-27, available at: www.slqsuae.org/wp-content/uploads/2014/12/Page-24-27.pdf

Chong, B.L., Lee, W.P. and Lim, C.C. (2012), "The roles of graduate quantity surveyors in the Malaysian construction industry", *Proceedings of the International Conference on Management and Education Innovation*, pp. 17-20, available at: www.ipedr.com/vol37/004-ICMEI2012-E00012.pdf (accessed 27 May 2014).

Construction Skills Queensland (2012), "Building and construction industry definitions", available at: http://csq.org.au/about-csq/building-and-construction-industry-definitions (accessed 3 March 2014).

Crafford, G.J. and Smallwood, J.J. (2007), "Clients' views on quantity surveying competencies", *Acta Structilia: Journal for the Physical and Development Sciences*, Vol. 14 No. 1, pp. 33-55.

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.

Department for business innovation and skills (2013), "UK construction: an economic analysis of the sector".

Department of Census and Statistics, Sri Lanka (2009), "Annual survey of construction industries".

Fanous, A. and Mullins, A. (2012), "Surveying the field: changes in quantity surveying", available at: www.smashwords.com/books/download/215763/1/latest/0/0/surveying-the-field-changes-in-quantity-surveying.pdf (accessed 17 August 2014).

Finkel, G. (1997), *The Economics of the Construction Industry*, Armonk, M.E. Sharpe, New York.

المنارة للاستشارات

www.

Graham, I.S. (2016), "Building information modelling and its impact on the future role of the quantity surveyor", available at: https://surveyortoolkit.com/2016/03/05/bimandtheqs/ (accessed 6 March 2017).

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).

Higham, A. and Thomson, C. (2015), "An evaluation of construction professionals sustainability literacy in North West England", in Raidén, A.B. and Aboagye-Nimo, E. (Eds), *Proceedings of 31st Annual ARCOM Conference, 7-9 September, Association of Researchers in Construction Management, Lincoln*, pp. 417-426.

Hillebrandt, P.M. (1984), *Analysis of the British Construction Industry*, Macmillan, London.

Institute of Quantity Surveyors Sri Lanka (IQSSL) (2015), "IQSSL membership", available at: www.iqssl.lk/membership/about-membership.html#ROUTES (accessed 5 April 2017).

Jayalath, C. (2013), "Quantity surveyors facing white collar cold mafia is none other than a curse to national development efforts", available at: www.lankaweb.com/news/items/2013/07/19/quantity-surveyors-facing-white-collar-cold-mafia-is-none-other-than-a-curse-to-national-development-efforts/ (accessed 5 June 2014).

Jeyamathan, S.J. (2005), "Identifying and analysing duties and skills of quantity surveyors in Srilanka", Unpublished bachelor's dissertation, University of Moratuwa.

Kanewala, S.D. (2003), "Modelling the competencies required by professional quantity surveyors in Srilanka", Unpublished bachelor's dissertation, University of Moratuwa.

Karunarathna, A.M.A.P. (2006), "Five years look ahead: quantity surveyors expectations in Srilanka", Unpublished bachelor's dissertation, University of Moratuwa.

Khan, R.A. (2008), "Role of construction sector in economic growth: empirical evidence from Pakistan economy" *Proceedings of the First International Conference on Construction in Developing Countries*, pp. 279-290.

Lee, C.C.T. and Hogg, K. (2009), "Early career training of quantity surveying professionals", available at: www.irbnet.de/daten/iconda/CIB_DC24200.pdf (accessed 17 June 2014).

Munzenmaier, C. and Rubin, N. (2013), *Perspectives: Bloom's Taxonomy: What's Old Is New Again*, The eLearning Guild, Santa Rosa.

Murphy, R. (2011), "Strategic planning in Irish quantity surveying pracitces", available at: http://arrow.dit.ie/cgi/viewcontent.cgi?article=1003&context=beschreoth (accessed 15 June 2014).

Nagalingam, G., Jayasena, H.S. and Ranadewa, K.A. (2013), "Building information modelling and future quantity surveyor's practice in Sri Lankan construction industry", *Proceedings of The Second World Construction Symposium 2013, Colombo*, pp. 81-92.

Niroshan, W.K.G.M.T. (2012), "Skills and competencies required to enhance the employability of Sri Lankan graduate quantity surveyors", Unpublished bachelor's dissertation, University of Moratuwa.

Nkado, R. (2000), "Competencies for the future career of the professional quantity surveyor", available at: www.reading.ac.uk/AcaDepts/kc/wkc1/source/bon/2000/Nkado.pdf (accessed 9 March 2014).

Nkado, R. and Meyer, T. (2001), "Competencies of professional quantity surveyors: a South African perspective", *Construction Management and Economics*, Vol. 19 No. 5, pp. 481-491, doi: 10.1080/01446193.2001.9709624.

Nkado, R.N. (2000), "Competencies required by quantity surveyors in South Africa", *Proceedings of the 16th Annual ARCOM Conference*, pp. 11-20, available at: www.icoste.org/AIQS%20Competencies.pdf (accessed 9 March 2014).

Ofori, G. (1990), *The Construction Industry: Aspects of Its Economics and Management*, Singapore University Press, National University of Singapore, Kent ridge, Singapore.

المنارة للاستشارات

www.

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. 3 No. 5, pp. 206-215.

Perera, S. (2006), "Quantity surveying: a detailed appraisal of the profession and a vision for the future".

Perera, S., Pearson, J. and Dodds, L. (2010), "Alignment of professional, academic and industrial development needs for quantity surveyors", *Proceedings of the In RICS COBRA Research Conference*, pp. 1-20, available at: http://nrl.northumbria.ac.uk/13011/ (accessed 17 October 2014).

Perera, S., Pearson, J., Robson, S. and Ekundayo, D. (2011), "Alignment of academic and industrial development needs for quantity surveyors: the views of industry and academia", *Proceedings of the RICS COBRA Research Conference*, pp. 676-686, available at: www.academia.edu/901056/Alignment_of_academic_and_industrial_development_needs_forquantity_surveyors_the_views_of_industry_and_academia (accessed 10 July 2014).

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/ (accessed 4 April 2014).

Prescott, A. (2008), "Advantages and disadvantages of secondary research", [Web log post], available at: http://prosandconsofsecondaryresearch.blogspot.com/ (accessed 9 August 2014).

Royal Institution of Chartered Surveyors (RICS) (2014), "Assessment of professional competence, royal institution of chartered surveyors, London", available at: www.rics.org/Global/RICS-APC-Requirements-and-Competencies-Aug-2014-WEB.pdf (accessed 10 April 2016).

Royal Institution of Chartered Surveyors (RICS) (2015), "Member (MRICS)", available at: www.rics.org/lk/join/member-mrics/ (accessed 6 May 2014).

Sacks, R. and Pikas, E. (2013), "Building information modelling education for construction engineering and management. I: Industry requirements, state of the art, and gap analysis", *Journal of Construction Engineering and Management*, Vol. 139 No. 11.

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. 2 No. 1, pp. 17-27.

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 2014).

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 2014).

St Andrews Management Institute (2008), "2020 Vision: the future of UK construction", available at: www.cskills.org/uploads/2020VisionScenariosforconstructionskills_tcm17-11077.pdf (accessed 9 April 2014).

Stanley, R. and Thurnell, D. (2014), "The benefits of, and barriers to, implementation of 5D BIM for quantity surveying in New Zealand", *Australasian Journal of Construction Economics and Building*, Vol. 14 No. 1, pp. 105-117.

Wao, J.O. and Flood, I. (2016), "The role of quantity surveyors in the international construction arena", *International Journal of Construction Management*, Vol. 16 No. 2, pp. 126-137, doi: 10.1080/15623599.2016.1142251.

Willis, C.J. and Ashworth, A. (1987), *Practice and Procedure for the Quantity Surveyor*, 9th ed., Collins, London.

المنارة للاستشارات

www.

Yogeshwaran, G., Perera, B.A.K.S. and Perera, K.T.P.K. (2014), "Competencies expected of graduate quantity surveyors by the Sri Lankan construction industry", *Proceedings of the 7th FARU International Research Symposium on Practice Based Research: Exploring Built Environment Through Evidence*, pp. 18-32, available at: www.mrt.ac.lk/foa/faru/documents/FARU%20Journal%202014.pdf (accessed 21 August 2014).

Zakaria, N., Munaaim, M.E.C. and Khan, S.I. (2006), "Malaysian quantity surveying education framework", *Proceedings of the Built Environment Education Annual Conference*, pp. 1-19, available at: http://elib.uum.edu.my/kip/Record/um741323 (accessed 4 April 2014).

Zhou, L., Perera, S., Udeaja, C. and Paul, C. (2012), "Readiness of BIM: a case study of a quantity surveying organisation", *Proceedings of the First UK Academic Conference on BIM*, pp. 118-128, available at: nrl.northumbria.ac.uk/11831/1/BIM_conference_paper_Lei_Zhou.pdf (accessed 17 August 2014).

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