QUANTITY SURVEYING EDUCATION FOR SUSTAINABLE DEVELOPMENT: INDUSTRY PERCEPTION

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Research has shown that a lacuna exists between the industry and tertiary educational institutions in terms of acquired competencies by Quantity Surveying graduates. It has also been found that there exists an absence of policy moderating the competency threshold for Quantity surveying graduates. Due to the aforementioned, employers of labor have overtime been left unsatisfied with the competency exhibited by graduates. This gap has not really been explored by researchers, thus the expectation of the industry is relatively undocumented. This study, therefore, is aimed primarily at bridging the gap by determining the industry expectations of Quantity surveying graduates and the competence acquired by the graduates. Thus the study is from the employers' perspective. It employed quantitative method of data gathering. Questionnaires were administered. Over 100 structured questionnaires were distributed through online platforms and 34 were returned with 33 fit for analysis and 1 was unfit for analysis. Therefore, a total of 33 questionnaires were analyzed. 17 number of competencies were highlighted as the competencies expected of QS graduates by employers. Analysis through SPSS was applied for the quantitative data. The study established the top ten preferred competencies by employers as trustworthiness, effective communication, team player, knowledge of construction technology, meticulousness, creative thinking, problem-solving, positive attitude, valuation of work done, and information literacy skills. It is evident that soft skills are preferred over professional competencies. The study concluded that for sustainable development to be a reality, the current curriculum must be revised to be competence driven and industry dynamism oriented.

Keywords: graduate competency, industry competency dynamics, sustainable development

INTRODUCTION

Education births the acquisition of skills. The application of acquired skills in a profession is known as competence (Dada & Jagboro, 2012). Graduates are equipped with the necessary skills required for success in career through

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education. Education is the bedrock for future accomplishments. The failure or otherwise of graduates to get adequately educated is apparent in the skills obtained and competencies exhibited on the job. Graduates metamorphose to professionals in the industry, putting into practice the skills acquired in the place of learning. The graduates without required skills end up unemployed in their chosen field of study (Hanapi & Nordin, 2014). Consequently, it leaves most graduates wondering if obtained competencies meet up with the employers' specification for most job openings. A direct relationship between education citadels and industry requirements is inevitable (Industry Oriented Education(IOE)) (Gharehbaghi, 2015). Education being the bedrock of the industry must be executed in line with the requirements and expectations of the industry it feeds. The success or failure of this leads to unqualified graduates and unemployment.

Graduates unemployment has no significant connection with the economy but with their incompetence (Hanapi & Nordin, 2014). A study by Menon & Athanasoula-Reppa, (2017) established that many graduates exit the unemployment web through the acquisition of additional skills and competencies. The unemployment rate the world over keeps soaring; it is not an exception in Nigeria, it was 18.8% in Q3(third quarter) of 2017 and increased to 23.1% in Q3 of 2018(NBS, 2018). Employability or otherwise of a graduate lies in the competency exhibited by the graduate. This stems from the quality of education (learning curriculum) received by the graduate; tertiary education institutions should "continually aspire for graduates to be provided with relevancy and effectiveness of work so as to escalate their employment"(Woya, 2019).

Industry Oriented Education (IOE) is the solution to meeting the industry expectation of graduates that meets the 21st-century demand of the industry (Gharehbaghi, 2015). The competencies of the graduates are a function of their knowledge base from the place of higher education. The failure to teach students (who eventually become the graduates and professionals in the industry) with the industry state of the art produces half-baked graduates. According to Forbes.com, employers place value on individual workforce based on their role and competency.

Competency is a determinant of value. Value is the reason for the employer's interest in a job-seeking graduate. Studies found that the soaring unemployment rate is as a result of graduate's competency(Hanapi & Nordin, 2014). Therefore, it can be deduced that a wide disparity exists between what is taught in school and what is obtained in the real world. It is common to hear young graduates and penultimate grade students (who went for internship) grunting about the wide gap that exist therein. This trend is not limited to students only as practicing firms and principals also lend their voice to the disparity between industry expectation and graduates competencies. (RICS, 2015). Peterson, Hartmann, Fruchter, & Fischer, (2011) clamored for the need to intertwine theoretical (abstract) knowledge with real-life situations and scenarios. To address this issue, the Nigerian Institute of Quantity Surveyors (NIQS) advocated for the review of the curriculum content of higher institutions offering quantity surveying to include intensive ICT training (Oyediran, 2004). The position of the body is as a result of his claim of the gap in the educational system that has failed to embrace new technological advancement in the industry. This further gives credence to the existence of and an urgent need

to close up the existing gap. Oyediran (2004) in a study found out that Architecture, Engineering, and Construction (AEC) educators lack ICT facilities capable of integrating IT culture into the educational system of the AEC industry graduates. It is obvious that the educators are ill-equipped for the 21st century, thus they (educators) cannot give what they do not have in terms of knowledge transfer. Therefore, it can be said that the students and educators are not adequately equipped for the 21st-century construction industry. This present state is in contrast with education serving as the incubation unit for practice. The knowledge applied in practice is an offshoot of a firm foundation gotten from education. According to RICS, Quantity Surveyors are highly trained professionals offering expert advice on construction costs. A professional Quantity surveyor must have gone through the necessary education and training to carry out the expected roles and responsibilities. Therefore, it suffices to say that the present crop of graduates are not measuring up to the definition aforementioned.

Various studies has been conducted on the competency of the Quantity surveyor (AIQS, 2012; Dada & Jagboro, 2012; Hassan, Ismail, Zaini, Hassan, & Maisham, 2011; Jaafar, Jalali, & Sini, 2015; Nkado, 2000; Nkado & Meyer, 2001; Oluwatosin & Amos, 2016). Unlike on other fields (for instance engineering) where different studies have been conducted on graduate competency, a deficiency exists regarding quantity surveying graduates competence (Hanapi & Nordin, 2014; Hassan et al., 2011; Taiebat & Ku, 2009). Previously conducted studies on graduate competence posited that unemployment is an offshoot of graduate incompetency (Hanapi & Nordin, 2014). Also, Gharehbaghi, (2015) opined that schools can only be an incubator for the industry if the curriculum is designed to meet industry expectations.

Meanwhile, education that is industry needs tailored has been the main thrust of education sustainability. De Haan, (2006) compared the present conventional approach and the competence focused approach:

"*Competence-oriented educational concepts focus on output, whereas conventional syllabuses and didactic approaches focus on input: the latter raises the question about which subjects pupils should study. By contrast, the output approach asks what problem-solving strategies, concepts, and abilities for social action they should have*"

Education for sustainable development, therefore, focuses on equipping graduates with skills and competence to impact the economic, environmental and social facets of the society. It is imperative that educational curriculums are designed to solve specific problems in the society and the students must be equipped with the necessary competencies to this end. Predefined key competencies serves as yardsticks for objectively evaluating student learning and teaching effectiveness (Makulova, Alimzhanova, & Bekturganova, 2015; Wiek, Withycombe, & Redman, 2011). According to Barth et al., (2007),

"*Higher education for sustainable development (ESD) aims at enabling people to not only acquire and generate knowledge but also to reflect on further effects and the complexity of behavior and decisions in a future-oriented and global perspective of responsibility*".

However, achieving education for sustainable development will be in terms of cognitive and non-cognitive approaches. Its orientation must be situated within the basis of these consequences: competence-orientation, societal orientation, and individual centering (Barth et al., 2007). Therefore, achieving education for sustainable development is beyond the traditional curriculum of academic exercises but one that ensures practical orientation and accommodates well-rounded components (extracurricular activities, learning in group, interdisciplinary learning, volunteer work, learning by doing among others) tailored towards achieving key competencies required to solve industry problems(Barth et al., 2007; Makulova et al., 2015).

This study was embarked upon to identify the competencies current quantity surveying graduates possess, the competencies the industry is expecting quantity surveying graduates to acquire and a gap analysis was carried. This analysis was done to determine the deviation or convergence of the graduate-acquired and industry-expected competencies.

COMPETENCIES FOR THE QUANTITY SURVEYING PROFESSION

Different studies have been conducted establishing diverse competencies required of a quantity surveyor. Table 1 gives competencies gleaned from the literature. However, this study adopted a mixture of competencies (soft/behavioral skills and professional competencies). Soft skills are defined as " a collection of personal, positive attributes and competencies that enhance a person's relationships, job performance and value to the market"(Vijayalakshmi, 2016). They are mainly grouped under the mandatory competencies required by all quantity surveying professionals by RICS (RICS, 2015). They are considered necessary for all professional members of the institute. Soft skills as adopted by this study include trustworthiness, team player, good communication skills, positive attitude among others. Professional competence is the primary competencies required for the execution of the quantity surveying duties. These are technical and professional competencies acquired through training. RICS classified referred to them as core competencies. In this study, these competencies include estimating, knowledge of construction law, measurement among others.

The competencies were not separated in the questionnaire. They were mixed – these competencies were gotten from previous studies. This approach was adopted so as to enable the respondents to make a better-informed response. This enabled them to put all the competencies on an equal pedestal while filling the questionnaires.

Table 1: Quantity surveying competencies from literature

Author	Competencies
Cynthia & Keith, (2009)	preparation of life cycle costing data and advice, application of value management, recommendation of a suitable procurement route, preparation of feasibility studies, advising client and negotiating with contracting parties in contract administration, preparation of schedules of works or 'Bills of Quantities' involving measurement and estimating, management and preparation of variation accounts, preparation of tende report, cost management to ensure budget compliance, preparation of final account, interim valuation of construction work

Dada & Jagboro, (2012)	Computer literacy, Building Engineering, Information Technology, Economics, Measurement/Quantification Civil/Heavy Engineering, Professional Practice Construction, Law, Interpersonal Skill, M & E service, Engineering, Financial skill, Leadership skill, Managerial Skill, Communication skill, Marketing/Business Skill Mapping/Surveying, Actuarial skill (knowledge about insurance), Gas and Petrochemical Engineering, Knowledge about International Trading Investment analysis, Solid mineral engineering, Cost Planning and Control, Estimating, Construction Procurement System, Contract Documentation, Contract Administration Project Management, Feasibility/Viability Studies, Valuation Financial Management, Development Economics, Risk Management, Life Cycle Costing, Facility Management, Arbitration and Dispute Resolution, Economic Mgmt. of Urban Infrastructure
Nkado, (2000)	Computer literacy and information technology, Procurement and financial management, Economics of construction, Construction contract practice, Measurement, Professional practice, Marketing, Personal and interpersonal skills, Development appraisal, Advanced financial management, Leadership and general management skills, Project management, Skills to work with emerging contractors, Skills in managing a business unit, Construction technology and environmental services, Arbitration and other dispute resolution procedures, Law, Property investment funding, Management
Nkado & Meyer, (2001)	Current competencies: expertise in computer literacy and information technology, procurement and financial management, economics of construction, construction contract practice and measurement. Competencies for future successful services include expertise in computer literacy and information technology, procurement, and financial management, economics of construction, project management, and marketing
RICS, (2015)	Mandatory competencies Level 3 (Conduct rules, ethics, and professional practice) Level 2 (Client care, Communication and negotiation, Health and safety) Level 1(Accounting principles and procedures, Business planning, Conflict avoidance, management and dispute resolution procedures, Data management, Sustainability, Team working) Core competencies Level 3(Commercial management of construction or Design economics and cost planning, Contract practice, Construction technology, and environmental services, Procurement and tendering, Project financial control and reporting, Quantification and costing of construction works) Optional competencies Level 2 from: (Building information modeling (BIM) management, Capital allowances, Contract administration, Corporate recovery and insolvency, Due diligence, Insurance Programming and planning, Project evaluation, Risk management, Conflict avoidance, management, and dispute resolution procedures or Sustainability.

RESULTS AND DISCUSSION

Survey research design was adopted in this work. Data was sourced from organizations involved in quantity surveying consultancy practice only. A survey was conducted to determine the consultants' knowledge of quantity surveying graduates acquired competencies and the practice' expectation from the graduates. Questionnaires were employed in getting information from quantity surveyors with at least 10years of experience in consulting practice and/or a registered member of the Nigerian Institute of Quantity surveyor. This category of Quantity surveyors were selected for they are the bulk that constitute the professional governing body (NIQS) in Lagos state. Therefore, they constitute the decision-making body and also interface with the student frequently.

Competencies observed in recent Q.S graduates by industry professionals

Table 2: Observed competencies in QS graduates

Competency	Mean
Trustworthiness	3.78
Positive attitude	3.58
Effective communication	3.53
Strong interpersonal ability	3.52
ICT compliant	3.52
Information literacy skills	3.47
Knowledge of construction technology	3.45
Valuation of work done	3.45
Team player	3.42
Estimating	3.41
Meticulousness	3.36
Creative thinking	3.36
Problem-solving	3.34
Preparation preliminary cost estimate	3.31
Measurement of building services	3.22
Knowledge of construction law	3.22
Cost monitoring	3.13
Managing the tendering process	3.13
Cost advice	3.09
Contract documentation	3.06
Measurement of civil engineering works	3.06
Project management	3.03
Preparing feasibility studies	2.91
Negotiation competences	2.81
Knowledge of QS software	2.76
Knowledge of BIM	2.22

Where 5= always observed (AO), 4=mostly observed (MO), 3=sometimes observed (SO), 2= rarely observed (RO), 1= never observed (NO)

In table 2, respondents highlighted 17 competences which made a mean of 5. Overall, the most observed competence (soft skill) is trustworthiness. However, the most observed professional competence possessed by quantity surveying graduates is contract documentation. The other competencies observed in QS graduates are Trustworthiness, effective communication, information literacy skills, estimating, problem-solving, preparation of preliminary estimate, measurement of building services, knowledge of construction law, cost monitoring, managing tendering process, and cost advice (all with mean of 6 and ranked 2-12). The other competencies with mean of 5 and ranked 6 - 17 are measurement of civil engineering works, project management, preparing feasibility studies, negotiation, and knowledge of BIM.

From this, it is evident that the top five competencies observed in QS graduates is dominated by behavioral competencies- trustworthiness, effective communication skills and information literacy skills. However, contract documentation and estimating are the first and the fifth on this list. This is in line with the observed

trend of competence where 42.4% of respondents observed High soft skills/Low professional competences combination.

Thus, the present curriculum has been able to equip our graduates with those top skills highlighted by the employers (contract administration, Trustworthiness, effective communication, information literacy skills, estimating, problem-solving, preparation of preliminary estimate, measurement of building services, knowledge of construction law, cost monitoring, managing tendering process, cost advice, civil engineering works, project management, preparing feasibility studies, negotiation and knowledge of BIM). However, it has failed to equip the graduates in this same level with Positive attitude, Strong interpersonal ability, ICT compliant, Knowledge of construction technology, Valuation of work done, Team player, Meticulousness, Creative thinking and Knowledge of QS software. Putting this outcome against the AIQS and RICS requirement of competencies, it can be observed that there exists a wide gap between the graduates' competencies and the acceptable standards.

Basic competencies expected of recent Q.S graduates by employers

Table 3: Expected competencies from QS graduates

Competency	MIS
Trustworthiness	4.79
Effective communication	4.55
Meticulousness	4.48
Creative thinking	4.39
Knowledge of construction tech	4.36
Team player	4.36
Positive attitude	4.24
ICT	4.18
Problem-solving	4.18
Strong interpersonal skills	4.18
Information literacy skills	4.10
Estimating	4.03
Measurement of building services	4.00
Contract documentation	3.97
Measurement of civil engineering works	3.88
Valuation of work done	3.88
Managing tender process	3.85
Cost monitoring	3.79
Preparation of preliminary cost estimate	3.73
Knowledge of construction law and regulations	3.70
Cost advice	3.64
Negotiation competences	3.55
Knowledge of QS software	3.52
Feasibility studies preparation	3.44
Project management	3.30
Knowledge of BIM	2.94

Where 5= highly essential(HE); 4= very essential(VE); 3= essential(E); 2=of little essence(LE); 1= not essential (NE).

From Table 3 above, respondents indicated that the most expected competency is trustworthiness (soft skill). However, the most expected competence expected in

an average QS graduate is information literacy skill. Industry professionals expect graduates to possess the ability to recognize when and what information is needed and have the ability to locate, evaluate, and use effectively the needed information. Other competencies ranking in the top 10 are feasibility studies preparation, trustworthiness, effective communication, meticulousness, creative thinking, knowledge of construction technology, team player, positive attitude and ICT. Other competencies with a significant mean from the analysis are problem-solving, Strong interpersonal skills, Estimating, and Measurement of building services.

They expect the training from the school to have equipped the graduate with the highlighted skills. Therefore, it can be said that our school curriculum should be tailored to meet these set of competence as required by the industry. Previous research showed that employers have always complained of graduates not having the right set of competencies that meets their expectations(Davies, Csete, & Poon, 1999)

GAP ANALYSIS

This section seeks to determine the difference the obtained and the expected. The expected competencies will be tested against the observed competencies. This is to determine the gap that exists between the classroom-imparted competencies and expected competencies by employers. To this end, a paired sample T-test was conducted to compare the mean of the expected and the observed competences by the graduates. This is to indicate the level of significant difference or otherwise between the observed and expected competencies.

According to Pallant, (2010), paired sample T-test can be interpreted using two approaches. These are

1. Through the probability (p) value. If this value is less than .05 (e.g. .04, .01, .001), then it can be concluded that there is a significant difference between the two scores under comparison.
2. By comparing the mean values. Having established that there is a significant difference, the next step is to find out which set of scores is higher and it is achieved through the Paired Samples Statistics table. This gives the Mean scores for each of the two sets of scores.

It is evident from the table 4 that none of the competence was had p>0.05. It connotes that there exists a wide gap between the observed and expected competencies acquired by the quantity surveying graduates. It is therefore imperative that a total revision of the school curriculum is necessary to equip the graduates and make them suitable for the industry.

From the test, effective communication, creative thinking, team playing, strong interpersonal skills, problem solving, ICT, meticulousness, positive attitude, information literacy skills, contract documentation, knowledge of construction technology, knowledge of construction law and regulation, managing tender process, cost monitoring, and cost advice has negative values of t.

The identification of this gap aligns with the position of (Cynthia & Keith, 2009; Othman, 2013; Perera, Babatunde, Zhou, Pearson, & Ekundayo, 2016; Perera,

Pearson, Robson, & Ekundayo, 2011). These expected must be covered in the school curriculum so as not to enhance the relevance of the QS graduates (Gharehbaghi, 2015; Refrigeri & Aleandri, 2013; Sais, Shafiei, & Omran, 2010).

Table 4: Gap analysis of observed against expected competencies of QS graduates

Competency (N=33)	t	p
Effective communication	-5.75	.000
Creative thinking	-5.51	.000
Team player	-5.59	.000
Strong interpersonal skills	-3.75	.001
Problem solving	-4.68	.000
ICT	-3.29	.002
Meticulousness	-5.40	.000
Positive attitude	-3.55	.001
Information literacy skills	-3.18	.004
Contract documentation	-4.89	.000
Knowledge of construction tech	-4.75	.000
Knowledge of construction law and regulation	-2.49	.018
Managing tender process	-5.04	.000
Cost monitoring	-4.03	.000
Cost advice	-3.24	.003
Preparing feasibility studies	2.82	.009
Negotiation competences	3.83	.001
Preparation preliminary cost estimate	2.13	.041
Valuation of work done	2.36	.024
Project management	2.27	.031
Knowledge of BIM	3.86	.001
Measurement of civil engineering works	5.89	.000
Measurement of building services	3.73	.001

Significance level is p>0.05

CONCLUSION

It has been established that to be sustainable, a competence must respond to the dynamics of the external environment (Sanchez, 2004). This study has established that the current quantity surveying curriculum is inadequate and that the Quantity surveying graduates are not meeting up with the dynamism of industry competence requirement. Thus, the current curriculum cannot be referred to as meeting the criteria of education for sustainable development. Furthermore, the tertiary education institution as an incubator is not effective in the delivery of its duties. Thus it is imperative that tertiary education institutions offering Quantity surveying must work in synergy with and study the need of the industry so as to respond effectively to its dynamics. Also, students are to be encouraged to hone their soft skills (while in school) as competencies acquired during extracurricular activities are also important; Learning is not restricted to formal education settings only. The study reveals the preference of soft skills over professional competence by the industry. Lastly, a review of the traditional curriculum to a competence

centered curriculum is important if the quantity surveying education in Nigeria is to be sustainable. This will be achieved with the help of all stakeholders.

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