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Review of Correlation of Quantity Surveyors' Education in Nigeria to Skill Requirements for Administration of Civil Engineering Projects

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Abstract

Whereas quantity surveyors are adequately engaged in engineering projects in Great Britain from where quantity surveying education in Nigeria derived its source and model, their involvement seems sub-optimum in Nigeria, attributably to perception of the correlation of quantity surveyors' education to engineering projects' requirements. This study examined the course curriculum and contents for quantity surveying at both the degree and higher diploma levels with the view to investigating the proportion of education and training of quantity surveyors in the Nigerian education system at undergraduate level that correlate to the skill requirements of the administration of civil engineering projects. The study identified the administration of civil engineering projects under 3 main headings viz: Design, Construction, and Cost appraisal. The study reveals a good correlation of the education and training of quantity surveyors to the skill requirement for providing services requiring measurement of civil engineering works as well as services requiring evaluation of civil engineering works and financial management. The study also revealed 51.2% and 52.2% proportion of the curriculum and course content of University and Polytechnic respectively as focusing directly on the requirement of cost appraisal and administration of the financial aspects of civil engineering and other engineering projects.

Keywords: correlation, education, skill requirement, administration, and civil engineering, quantity surveying.

1. Introduction

The quantity surveying profession largely developed over the 19th century. According to Jagboro (1991), quantity surveying profession was at start known for expertise in building work. There is, however, an increasing evolution of the profession into new fields including engineering. For this evolution to be worthwhile in Nigeria, there is the need to understand the major aspects under which engineering constructions are administered, and the scope of quantity surveyors' education and training in Nigeria. Seleey (1993) identified nine major aspects around which engineering contract administration revolved. These are contractual arrangement, contract documentation, tendering procedure, site organization, site supervision, communication, measurement and valuation of works, instruction and variations, settlement of claims, and certificate. Bello (2003) summarizes these as 'design and construction' and 'cost appraisal and construction'.

In almost all the British colony, quantity surveyors services are fully appreciated for all forms of engineering projects. The situation is different in Nigeria where their involvement is fully appreciated for building engineering constructions but at seemingly low level in engineering projects. Some previous works attributed this to professional rivalries while some are of the opinion that the present education/training of quantity surveyors in Nigeria has not led to adequate qualitative competence of the quantity surveyors due to the embryonic state of the discipline. Quantity Surveying as a discipline concerned with detailed calculation and measurement of materials and labour required for construction activities including building, and engineering project, reveals a multi-disciplinary nature. The quantity surveyors relevance, however, in the administration of engineering projects would be dictated by the correlation of the training and education of the profession in the Nigerian education system to the identified aspects of engineering project administration

2. Literature Review

Usman-Oyowe (1991) defines project administration as the application of the tools of management to safeguard the rights and liabilities of parties to a contract by administering the agreed rules, guidelines or conventions so that by this means, the employer secures the product at an anticipated cost. Ajanlekoko (2003) identified the basic goal in projects administration as maximization or optimization of the benefit /cost ratio in pursuance of clients objectives in term of utility, functions, quantity, time and cost of the project. Seleey (1993) is of the

opinion that sound knowledge and expertise of project design and cost solution to physical and geological problems are the required proficiency for administering civil engineering projects.

Mogbo (1998) identified quantity surveyors' education as an applied science which is in effect a construction economics and management oriented that covers various areas of construction sciences (engineering: civil, electrical, product and chemical, among others), pure and applied economics, finance, accounting, politics, sociology, government administration and law. The study identified quantity surveyors' training to be inter-disciplinary covering about 80% of course required providing financial administration required for all forms of constructions. Westcott and Burnside (2003) in similar view identified the areas of education and training of quantity surveyors to include Building, Civil engineering (including infrastructure), Railway, Petro-chemicals Oil and Gas, Mechanical and Electrical installations (including utilities and information technology) collectively called Heavy/Industrial engineering constructions). Seleey (1993) further asserted cost appraisal to be a substantial part of the education and training of quantity surveyors, whereas this represents only a part of the education and training of engineers.

The opinion of Jagboro (1991) that the training of quantity surveyors in Nigeria has not led to adequate quantitative competence of the professionals because of the embryonic state of the discipline is also supported by Mogbo (1998) who advocated for an overhauling to the quantity surveyors syllabi in the Nigerian tertiary institutions to respond to all engineering projects. Ajanlekoko (2003), however, emphasized the recognition of the curriculum of quantity surveying programme by the international assessment that quantity surveyors in Nigeria possess requisite skills, education and training to ensure value for money in all construction works. Similar opinion was held by Adebola (2002) who asserted that the present level of education and training of quantity surveyors in Nigeria is adequate for that required for all forms of engineering projects. Bello (2003) emphasized that in the UK and most of the British common-wealth, quantity surveyors have provided cost service for engineering works for over a century and most engineers have always recognized the benefits of quantity surveyors specialized skill and knowledge in cost and financial aspects of engineering design and construction. Awodele (2003), however, is of the opinion that lack of adequate training is not a serious factor that influences the involvement of quantity surveyors in civil engineering works in Nigeria.

3. Research Methodology

The study is essentially a review of the Higher Diploma and Degree syllabi of the Polytechnics and Universities of the Nigerian education system respectively. The syllabi were obtained from the polytechnic and universities in the south western Nigeria where quantity surveying are studied at both undergraduate and postgraduate levels. According to Seeley (1993), the skill requirement for the execution of civil engineering projects are sound knowledge and expertise of engineering construction including proficiency in proffering design solution to physical and geological problems; and proficiency in cost appraisal. Bello (2003) classified these skill requirements as 'Design and Construction' and 'Cost appraisal and Construction'. Three subjects are, however, identified. These are Design solution, Construction, and Cost appraisal. The Curriculum and Course Specification for Nigerian University system (2005) defines civil engineering as discipline involved in the planning, design, construction and operation of physical facilities essential to modern life and community living. It identifies adequate training in planning, design, construction, and operation of physical facilities. The Curriculum and Course Specification for Nigerian University system (2005) defines Quantity Surveying as discipline involved in financial probity in the conception, planning, and execution of development projects (all forms of engineering infrastructure). It identifies adequate training in feasibility studies of capital projects, cost modeling, contract documentation and procurement, contract administration and management, project management consultancy, information technology, facility management, arbitration, ands fire insurance assessment.

4. Discussion and Findings

A sample drawn from the curriculum specification of the Nigerian University commission and the National Board of Technical Education for degree courses in quantity surveying and civil engineering was used for the analysis in table 1. The list of the courses is included in the appendix I. The table reveals a 32.6% and 52.2% of the total units of the Polytechnic courses for 'Design and Construction' and 'Cost appraisal and Management' respectively for quantity surveying; 28.4% and 51.2% for 'Design and Construction' and 'Cost appraisal and Management' respectively of the total units of the University courses for quantity surveying. It also reveals 58.4% and 7.5% of the total units of Polytechnic courses for 'Design and Construction' and 'Cost appraisal and Management' respectively for civil engineering; and 67.8% and 7.1% for 'Design and Construction' and 'Cost appraisal and Management' respectively of the total units of University courses.

The result shows a greater correlation of civil engineers education and training to 'design and construction' and a greater correlation of quantity surveyors education and training to 'cost appraisal and management of civil and other engineering projects. These services constitute the major components of the cost appraisal and financial administration of engineering projects. The study indicates a low correlation between the curriculum and course specification of quantity surveying in the Nigerian education system and 'Design and Construction' of civil engineering constructions. Expectedly, quantity surveyors are not expected to design and construct civil engineering infrastructure but to show adequate understanding of the design and construction with the aim of being able to communicate and interpret for the purpose of the cost management services. The results, however, agree with Seeley (1993) that while cost appraisal forms a substantial part of the education and training of quantity surveyors, it represents only a part of the education and training of civil engineers.

5. Conclusion

This study concluded that the education and training of quantity surveyors in Nigeria provides adequate skill requirement for providing services requiring measurement of civil engineering works as well as services requiring evaluation of civil engineering works and financial management with about 51.2% and 52.2% of the curriculum and course content of University and Polytechnic respectively satisfying directly the requirement of cost appraisal and administration of the financial aspects of civil engineering and other engineering projects. The study suggests continuous overhauling of the curriculum and course content of quantity surveying in the Nigerian higher education system. This will enable the discipline to meet international standard required for engineering projects growing challenges.

Table 1: Analysis of the Course Requirements: Degree and Higher Diploma

	Average Total Units of 'Design& Construction' Related Courses	Average Total Units of 'Cost appraisal & Management' Related Courses	Others Courses	Total Units
Degree Option:				
Quantity Surveying	57	103	41	201
Civil Engineering	143	15	53	211
Higher Diploma:				
Quantity Surveying	60	96	28	184
Civil Engineering	101	13	59	173
% of Core Courses:				
Degree Option;				
Quantity Surveying	28.4	51.2	20.4	100
Civil Engineering	67.8	7.1	25.1	100
Higher Diploma:				
Quantity Surveying	32.6	52.2	15.2	100
Civil Engineering	58.4	7.5	34.1	100

Source: Authors Calculation 2011

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Appendix 1 Course Requirements for Degree Programme in Civil Engineering

100 Level

General Chemistry I	4	General Chemistry II	4
History and Philosophy of science & Technology	2	Use of English II	2
Use of English I	2	Information Retrieval	1
Elementary Maths I	3	Logic & Philosophy	2
Engineering Drawing	3	Elementary Maths II	3
General Physics I	3	Vector, Geometry & Dynamics	3
General Physics III	2	Intro. To computer Sc.	2
General Physics Lab 1		Workshop practice	2
		General physics II	3
		General physics Lab II	1

200 Level

Physical Chemistry I	2	Intro. To Numerical Analysis	3
Mathematical methods	3	Strength of materials	3
Computer programme I	3	Engineering Drawing II	3
Manufacturing Tech. I	2	Basic Thermodynamics	3
Applied Mechanics	3	Basic Fluid Mechanics	3
Basic Electrical Eng.	3	Practical Agriculture	2
Engineering – in – Society	1	Basic Electrical Engineering II	3
General Agriculture	1	Basic Economics	3
Science of Materials	3		

300Level

Engineering Maths	3	Engineering Maths	3
Basic Civil Engineering	2	Introductory Eng. Geology II	3
Fluid Mechanics	3	Basic Hydrology	3
Strength of Materials II	4	Structural Mechanics	3
Intro. Eng. Geology I	2	Soil Mechanics	3
Civil Engineering Materials	2	Design of Structure	4
Engineering surveying	4	Surveying & Photogrammetry	3
Engineering statistics	2	Civil Engineering Mechanics	2
Engineering surveying / Photogrametry	2	Technical Report Writing	2

400 Level

Engineering Maths III	3	*SIWES	12
Hydraulic	3		
Civil Engineering Practice	2		
Design of structures II	2		
Element of foundation Eng.	3		
Elements of Architecture	4		
Highway Engineering	2		
Research methodology	1		
IT in Engineering	2		

500 Level

Engineering Economy	3	Engr. Management	3
Structural Engineering I	3	Structural Engr. II	2
Resources Engr.	3	Highway& Transportation System	4
Water & Waste Water Eng.	3	Project	3
Civil Engineering Seminar	3	Geotechnical Engr.	3
Project	3	Construction Engr.	3
Building Technology	3	Design of Hydraulic Structures	3
Drainage & Irrigation Engr.	3	Civil Engr. Systems Design	3
Environmental Engineering	3	Advanced Soil Mechanics	3

Course Requirements for Quantity Surveying in the Nigerian University System

100 Level

Graphic Communication	2	Into to Quantity Surveying	3
Nature of Environmental Science	2	Graphic Communication II	2
Engineering Drawing	3	Workshop Practice I	2
Elementary Mathematics	3	Elementary Maths II	3
General Physics I	3	Intro. To Computer Sc.	2
General Physics (Lab) I	1	General Physics II	3
General Chemistry I	5	General Physics (Lab) II	1
Use of English I	2	Use of English II	2
Information Retrieval	1	Logic & Philosophy	2

200 Level

Principle of measurement and Description I	3	Principle of Meas. & Descp. II	3
Building construction I	3	Building Construction II	3
Land surveying I	2	Land Surveying II	2
Into. To valuation I	3	Building Science	3
Statistical Methods I	2	Construction workshop Practice	2
Theory of Structures I	2	Introduction to valuation II	3
Basic Element of Planning	2	Statistical Methods	2
Manufacturing Tech. I	2	Theory of Structure II	2
General Agriculture I	1	General Agriculture II	2
Nigeria History & Culture	2		

300 Level

Meas. Of Building Work I	3	Meas. of Building works II	3
Construction Technology I	3	Construction Technology II	3
Estimating & Price Analysis I	3	Estimating & Price Analysis II	3
Maintenance of Constr. Works	3	Construction Material & Equip. II	3
Building Services & Equipment I	3	Building Service & Equipment	2
Intro. to Law and Tort	2	Economic Theory II	2
Economic Theory II	2	Building Structures: RC Design	3
Computer Programming I	3	Principle of Accounting	3

400 Level

Meas. of Civil Engr. Works	3	*SIWES	12
Construction Economics	3		
Building Contract Law	3		
Arbitration & Awards	2		
Computer Application to QS	2		
Principles of Marketing	2		
Research Methodology	1		
Quantitative Techniques in QS	3		
Building Structures; Timber/ Steel Design	3		

500 Level

Meas. of Construction Works I	3	Meas. of Construction Works II	3
Cost Control I	3	Cost Control II	3
Construction Contract Administration	3	Professional Practice & Procedure	3
Construction Management I	3	Construction Management II	3
Heavy Engineering I	2	Heavy Engineering II	2
Specification Writing	3	Construction Project Management	2
Project	3	Project	3

Course Requirements for Higher Diploma in Civil Engineering

ND1

Basic Principle in surveying	2	Basic Principle in surveying II	3
Technical Drawing	2	Descriptive Geometry	2
Structural Mechanics	2	Introductory Hydrology	2
Works Technology I	1	Science & Properties of Materials	3
Civil Engineering construction I	3	Strength of Materials	3
Algebra & Elementary Trigonometry	2	Engineering geology and Basic	
Intro. To Fluid Mechanics	2	Soil Mechanics	3
Intro. To statistics	2	Civil Engineering construction II	3
Use of English I	2	Calculus	2
Citizenship Education I	2	Use of English I	2
Physical & Health Education	1	Entrepreneurship Developments I	2

NDII

Intro. To Highway Engineering	2	Engineering survey I	3
Intro. To structural Design	2	Water supply and Sanitary	3
Soil Science and Irrigation Engineering	2	Hydraulics & Hydrology	3
Civil Engineering Drawing II	2	Workshop Technology II	1
Soil Mechanics	3	Theory of Structures I	3
Engineering Meas. & Evaluation	2	Hydrogeology	1
Civil Engineering Drawing I	2	Element of Geo-information	2
Civil Engineering	3	Intro. To Programming	3
Trigonometry & Analytical Geometry	2	Technical Report	1
Entrepreneurship Development II	2	Construction Management	2
Intro. To Computing	2		

HNDI

Quantity & Specifications II	2	Advanced Quantities & Specification	2
Hydraulics	2	Hydrology	1
Concrete Technology	2	Foundation Engineering	2
Advance Theory of Structure	2	Water & Waste Water Eng.	3
Advance Soil Mechanics	2	Design of Structural Elements	2
Engineering Survey II	2	Transportation Engineering	2

Construction Technology	2	Engineering Survey III	2
Use of English I	2	Advanced Construction Tech.	2
Advance Algebra	2	Communication in English	2
Engineering in Society	2	Advanced Calculus	2
		Industrial Management	2
HNDII			
Project I	3	Engineering Management	2
Foundation Design	2	Project	3
Structural Steel & Timber	2	Advance Foundation Design	3
Design	3	Plastic Design of Steel Structures	3
Advance Reinforced Concrete		Matrix & Energy Methods	
Design	3	in Structures	2
Numerical Methods		Pre-Stressed Concrete Design	2
Computer Programming	3	Statistical Method in	
Use of English II	2	engineering	2
Course Requirement for Higher Diploma in Quantity Surveying			
NDI			
Citizen ship Education	1	Communication in English II	2
English I	2	Trigonometry	2
Basic Land Surveying	2	Basic Principle of Surveying II	2
Technical Drawing	2	Building Science and Projectiles	
Logic and Linear Algebra	2	of Materials II	2
Building Science & Properties		Workshop Practice & Tech. II	2
of Materials	2	Building Economics II	2
Workshop Practice and Technology	2	Meas. Of Building works II	3
Building Economics	2	Building Construction II	3
Intro. To Measurement	2	Principles of Accounts	2
Building Construction	3		
NDII			
Strength of Materials	2	Statistics	2
Workshop Practice	2	Communication in English II	2
Building Construction II	3	Intro. To Computer	2
Meas. & Speciation II	3	Structures	2
Int. to Tendering & Estimating	2	Principles of Management	2
Principles of Construction		Principles of Civil Engineering	
Economics I	2	Measurement	2
Contract Law	1	Tendering & Estimating	2
Calculus	2	Principle of Construction	
		Economics II	2
Soil Mechanics	2	Maintenance Technology	2
Communication in English	2	Maintenance Technology	2
Intro. To Computer	2	Final Project	3

HND I

Advanced Meas. Of Construction Works I	3	Advanced Meas. Of Construction Works II	3
Construction Economics I	2	Construction Economics II	2
Construction Management I	2	Construction Management II	2
Contract Law and Arbitration	2	Conditions of Contract	2
Tendering & Estimating I	2	Tendering & Estimating II	3
Construction Technology I	3	Construction Technology II	3
Services I	2	Services II	2
Architectural Design & Drawing	2	Meas. Of Civil Engr. Works I	2
Industrial Relations	2	Technical Report Writing	2
Communication in English I	2	Computer Application to Project Management	2
		Communication in English II	2

HND II

Advanced Meas. Of Construction Works III	3	Advanced Meas. Of Construction Works iv	3
Construction Economics III	2	Meas. Of Heavy Engr. Works	2
Financial Management I	2	Marketing & Statistics	2
Construction Technology III	3	Construction Technology IV	2
Tendering and Estimating III	2	Tendering & Estimating IV	2
Professional Practice & Procedures I	2	Professional Practice & Procedures II	2
Valuation and Final Accounts Procedures I	3	Valuation & Final Account Procedures II	3
Maintenance Technology & Management	2	Estate Management & Valuation	2
Research Methodology	1	Final Project	3
		Operation Research	2

*SIWES (Student Industrial Working Experience Scheme)

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