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PREDICTING THE FUTURE OF QUANTITY SURVEYING PROFESSION IN THE CONSTRUCTION INDUSTRY

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ABSTRACT

Quantity surveying profession has changed over time to adapt to the changing and increasing requirements of project owners. In the year 2007 to 2011, the construction industry experienced economic downturn causing uncertainty in the profession. This study examined the developmental trend of the quantity surveying profession in the construction industry to determine its future. The independent variable was the current level of satisfaction of quantity surveyors while the dependent variable was the future growth of the profession. The working hypothesis was that the profession would experience future growth. A survey questionnaire via Qualtrics online survey software was administered to quantity surveyors to determine their opinion of the profession. Data collected were analyzed using SAS v9.4 statistical analysis software. The results showed a greater level of satisfaction of quantity surveyors with the current developments in the profession. Further, the current level of satisfaction with the profession strongly correlated with the chances of growth of the profession, implying a greater likelihood of future growth in the roles of quantity surveyors in the next 10-15 years. Areas such as information technology and sustainable construction would favor the growth. Thus, the hypothesis was supported. Another finding was that females tended to be fewer in the profession. Thus, it was recommended that further research be conducted focusing on gender equality and propose ways to encourage women to join the quantity surveying profession. Overall, the study concluded that quantity surveyors should improve and diversify their roles more to provide greater value to project owners as the profession seemed promising.

Keywords: Construction Industry, Predicting, Profession, Quantity Surveying

1. INTRODUCTION

The profession of quantity surveying has faced uncountable challenges in its development considering when it first came into existence.

It has grown and survived the storms to an extent that today it is a notable profession in the construction industry. In providing the best value to project owners, quantity surveyors (QS) determine cost estimates of projects and ensure that construction activities are executed in a manner that satisfy the project owner's needs. Their name emanates from their role of quantifying the amount of construction resources such as materials, labor, and equipment. They have different names in different countries. For example, United States of America (USA) sometimes call them project engineers, cost engineers/planners or estimators while other countries may call them building economists. Such titles are characteristic of some of their professional roles in construction such as planning or cost estimating of building and engineering works. Their roles may differ or get advanced in some countries such as in the Africa, Asia, and United Kingdom (UK) where they may undertake core roles in construction such as arbitration and overall construction project management.

In completing projects, quantity surveyors usually work with other construction professionals such as architects, engineers and in conjunction with project owners, governments, insurance companies, and contractors. However, the QS roles have significantly changed over the times to adapt to the changing nature of the construction industry, especially considering when it first came up in the 1820s. Part of the reason for this change was to meet the ever-changing needs of the clients and to beat the competition from other construction professionals such as architects or engineers. Similar to other professions in the construction industry, the effects of the recent economic meltdown was also evident in the quantity surveying profession in terms of job orders and development.

Some predictive studies have tried to bring hope to the construction industry. Research by the U.S. Department of Labor concluded that they expected employment of construction managers to grow by 17% from the year 2010 to 2020. As pointed out from their large-scale research, the percentage implied that about 86, 600 new jobs were expected for construction managers during this duration (Berry, 2013). This notion was reinforced by the August 2013 Jobs News Update that marked construction manager job as the third most meaningful jobs in the world (Newman, 2013). Research conducted by On Center Software (2015) concluded that construction management is turning to profitable best practices and technology to stay lean. They identified automated take-off, estimating, and project management in a cloud based format as avenues to improve productivity in construction. The outcome aligned with the research by RS Means (2015) which concluded that construction boom required better planning and estimating and that a 9.3% compound annual growth rate was expected until 2019. In addition, it aligned with Schneider (2015) that concluded on an increased employment of skilled crews and a strong demand for technological skills in the construction industry. It also stated that the Bureau of Labor Statistics projected a 2.6% compound rate in growth of construction jobs through 2022, making it the fastest growing industry in the decade (Schneider, 2015). These developments have a positive bearing on the QS profession.

From the recent research conducted up to the year 2015, it is apparent that the quantity surveying profession has not been extensively investigated to determine its present and future standing in the construction industry. Such a gap elicited and motivated an investigation of its developments in the construction industry. Specifically, the aim of this research was to examine the developmental trend of the quantity surveying profession to determine its future. The objectives were to determine the current level of satisfaction of quantity surveyors and to predict the future growth of the profession in the construction industry. The *current level of satisfaction with the profession* was the independent variable while the *future growth of the profession* was the dependent variable. Data was collected using survey questionnaire via Qualtrics survey tool while SAS v9.4 facilitated the data analysis.

The outcome of the study would be beneficial to quantity surveyors and project owners or clients as they would be able to know the current and future status of the profession in the construction industry. If the outcome is unfavorable, the quantity surveyors may find ways to keep up and/or diversify to other core areas requiring advanced skills in construction that would eventually benefit them and their clients.

2. LITERATURE REVIEW

2.1 History of Quantity Surveying Profession

The Royal Institution of Chartered Surveyors (RICS) documentation (2014) defined quantity surveying as a client led profession where the QS respond to the client needs and that they must continue with their own skill development depending on the ever changing project owners' requirements. The quantity surveyor adheres to the Continuing Professional Development (CPD) to keep up to date with the continuous changes that occur in the construction field. The dynamics in the construction industry has made the profession to change severally along the timeline.

The profession has been in existence since 1820s and has gained international recognition through construction professional organizations such as RICS and Quantity Surveyors International (QSI). RICS and QSI are construction professional organizations for those specializing in the financial as well managerial aspects of construction and engineering works. These organizations support and protect the character, status, and interests of quantity surveyors in addition to promoting high level of good practice of its members. QSI is an international construction professional body that is specific only to quantity surveyors while RICS covers all other construction professionals and an array of other skill areas such as real estate and construction business improvement. Overall, these construction professional organizations lay down the competency requirements for quantity surveyors for the assessment of their professional competencies. These competency requirements have so far assured the survival of the profession considering when it was first conceived (Said *et al*., 2010).

During the early years of quantity surveying, the roles involved quantifying construction works that entailed measurement and valuation of building works.

Over time, these roles have become narrow scoped, starting with preparation of bills of quantities (BoQ) and ended up with settlements of final accounts at the end of construction ventures (Oke *et al*., 2010; Moss, 2012). These roles have made some construction professionals to believe that QS roles could be replaced by anything capable of conducting arithmetic solutions. They have asserted that quantity surveying is of no use. Anon showed this doubt in 1889 by stating that '*the QS is not a necessity in the order of things. Any convenient and cheap method of multiplying drawings and specifications and placing copies in the hands of each estimator would answer the same purpose and get rid of the QS for good*' (Menaha *et al.*, 2011).

Despite this stance by Anon and others in the construction industry, the quantity surveying profession has been developing strategically to meet the owners' requirements of greater value in projects. Research has shown that the profession has undergone significant changes due to changing industrial and owner demands, advancements in information technology, and higher levels of competitions in the industry especially in the international construction arena that is characterized by large construction projects and diverse professionals (Smith, 2004).

2.2 Characteristics of the Quantity Surveying Profession

The developments in the quantity surveying profession have made it to develop a defined set of skills (Thayaparan *et al*., 2011). Quantity surveyors contribute at all stages of construction projects (Mackie & Cooper, 2012; Thayaparan *et al*. 2011). Their roles include ascertaining that the budgets are reasonable, identifying areas of possible cost risks and laying out avenues for mitigation, coordinating and making final cost reports at important stages of projects, identifying potential areas for value engineering, procurement of works of contractors, negotiating project activities, and assist in agreement on terms and conditions of construction works. In addition, they help in drawing up of construction contracts and handling change orders, including settling final project accounts.

As provided by RICS, they have been expanding their roles under the optional competency requirements. The RICS's optional competencies provide areas for future career expansion as well as providing avenues for improvement when meeting the needs of clients. In essence, the competencies enhance the professional quality of quantity surveyors through intra and inter-professional reflection (Nkado & Meyer, 2001). Overall, they must adhere to the construction ethical standards as they advance professionally (Aje & Awodele, 2006). This will create more appeal to project owners as providers of value in construction projects.

Advancing quantity surveying depends on its ability to respond to the changes or adjustments in the international construction business environment. Maintaining global relevance and significant improvement require the quantity surveyors to review their work operating landscapes to capture and adjust to imminent changes in areas such as their professional ethics, practices, and overall level of expertise (Frei & Mbachu, 2010). They need to understand their own objectives and the dynamic requirements of project owners in order to explore appropriate and innovative ways to deliver the needed value diligently and effectively.

In essence, they must evaluate their Strengths, Weaknesses, Opportunities and Threats (SWOT) to thrive in the wider construction industry market that is laden with high competitions from other professionals such as architects and engineers (Frei & Mbachu, 2010).

The opportunities and threats are the micro-environmental factors that can hinder or boost their abilities to execute or meet their project goals (Langford & Male, 2008). Political, Economical, Social, and Technological (PEST) model define and facilitate the identification of the many factors that operate in the construction's wider or macro-environment. Political factors such as unavailability of published rates of fees for professionals and levels of fee competitions in the construction industry have brought about greater opportunities to compete favorably with each one offering their own prices (Frei & Mbachu, 2010). Economic and market conditions including factors such as economic downturn in the construction markets are possible avenues or opportunities for future roles of quantity surveyors. Social factors such as relative uncertainty in the profession can pose a significant threat (Frei & Mbachu, 2009). Technological factors such as Information Technology (IT) advancements and value engineering or analysis are to reshape quantity surveying business environment. These offer great opportunities for quantity surveyors to develop to higher levels both technologically and in popularity.

IT advancements in areas such as Building Information Modeling (BIM), Building Energy Modeling (BEM) and estimating software could provide quantity surveyors with ways to fortify their standing in the construction industry. This is augmented by the belief that quantity surveyors are the professionals who are better placed to handle major information in construction projects because most of the pieces of information in construction tend to revolve around construction quantities, quality improvement and cost reduction which they usually take control of in projects. However, the current opportunities may be taken over by other professionals like architects or engineers if the quantity surveyors adopt a complacent approach in construction ventures that is characterized by little or no motivation to further develop or diversify their roles (Smith, 2004). Quantity surveyors currently have adequate strengths as they have ability for strong international ties, good network of clients, and a wide range of knowledge in construction processes (Frei & Mbachu, 2010). Their roles and strength in construction give them a greater level of satisfaction with their jobs, especially before the economic recession. However, females tend to be unsatisfied because they believe that the profession is gender biased (Bowen *et al.*, 2008).

Despite the profession being dominated by males, Bowen *et al*. (2008) found quantity surveyors to be generally satisfied with their jobs from a survey conducted on quantity surveyors in the South African construction industry. The factors influencing their job satisfaction included low supervision level, participation in creativity and decision-making, personal satisfaction in work, and recognition for achievement.

3. RESEARCH METHODOLOGY

3.1 Aim, Objectives, Variables, and Working Hypothesis

The aim of this research was to examine the developmental trend of the quantity surveying profession to determine its future. The objectives were to determine the current level of satisfaction of quantity surveyors and to predict the future growth of the profession in the construction industry. The independent variable was the *current level of satisfaction with the profession* while the dependent variable was the *growth of the profession in the next 10-15 years*. The duration was considered adequate forecast period to determine the future of the profession. The working hypothesis was that the quantity surveying profession would experience future growth.

3.2 Survey Questionnaire Design and Administration

In order to meet the aim and objectives of the research, an online survey questionnaire was administered to the quantity surveyors via Qualtrics survey software. Before its administration, five people (n = 5) agreed to take part in a pilot study to test the validity and reliability of the survey items. Cronbach's alpha statistic tested the reliability. The result of the pilot survey showed a Cronbach's alpha value of 0.85 implying that the questionnaire was reliable and that the items were well understood. Consent to conduct the research with human subjects was sought and granted by the Institution Review Board (IRB).

The questionnaire consisted of open ended and multiple-choice questions. One part of the questionnaire focused on the respondents' demographic data such as work title, number of years in construction field, project owner representative, and roles in projects. The other part required the respondents to rate their current level of satisfaction with their profession on a five (5) point Likert scale (1 = not rewarding, 2 = neutral, 3 = somewhat rewarding, 4 = rewarding, 5 = very rewarding). In addition, they were asked their opinion about the overall growth of their profession in the next 10-15 years on a similar scale (1 = not improve, 2 = neutral, 3 = somewhat improve, 4 = improve, 5 = improve highly). Finally, they were to give reasons for the growth.

The survey was sent to the membership email list-serve of QSI, an international quantity surveying professional organization that promotes the aims, objectives, and ideals of quantity surveyors worldwide. The QSI was chosen for this research since it was believed it would give a global representation of quantity surveyors. The respondents were assured of confidentiality and anonymity in their feedback. In order to improve the response rate, respondents were informed that the results would be reported in the next publication of QSI members' newsletter.

3.3 Sample Size and Data Analysis

The study employed 239 quantity surveyors who completed the survey. This sample size (n = 239) was considered adequate as required by parametric or univariate statistical analyses and tests that achieve adequate statistical power.

The quantitative data analysis utilized SAS v9.4 statistical analysis software (SAS, 2015) for both descriptive and inferential statistics. The descriptive statistical analysis results utilized the measures of central tendency and dispersion that comprised of the mean, median, mode, kurtosis, and skewness values while inferential statistics employed correlation and regression analysis as predictive indices in addition to pooled *t*-test statistics that tested for the equality of variance. The main purpose of these analyses was to determine the level of satisfaction with the current state of the profession and to provide an index of growth of the profession in future. Qualitative data themes were also identified and analyzed.

4. FINDINGS AND DISCUSSION

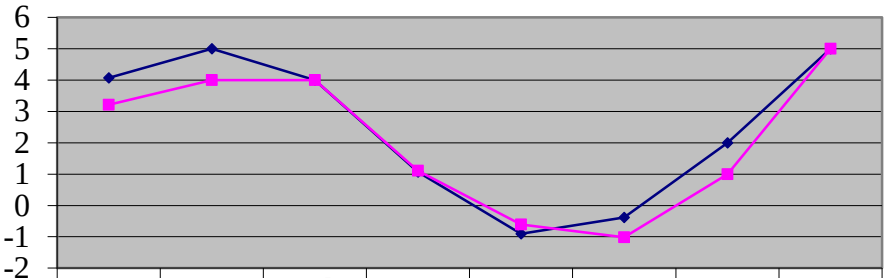
4.1 Demographics

The power of Qualtrics survey software is that it can detect and report the geographical location where a survey is taken. Thus, the results showed those who were working in construction ventures in Australia, Brazil, Colombia, Egypt, Ghana, Haiti, Japan, Kenya, London, Malaysia, Nigeria, Scotland, Seychelles, South Africa, Thailand, and USA. These countries provided a modest representation of the worldwide construction sector and market. Majority of the respondents were managing directors, presidents, chief quantity surveyors, consultants in quantity surveying, and professors in institutions of higher learning. This shows that the sample was from diverse international construction community who mostly held leadership and managerial roles in projects.

Out of those who took the survey, about 95% were males and 5% were females. This outcome is consistent with the study by Bowen *et al*. (2008) which concluded on the quantity surveying profession being male dominated. The survey results also showed that more than half (56%) of the respondents had over 15 years of experience in the quantity surveying profession and so they would be expected to provide invaluable ideas about the status of the profession. They were mainly involved in commercial construction projects (68%) and residential construction projects (53%). Out of the survey respondents, about 58% had been client/owner's representatives in construction projects. Some of their main duties entailed providing pre-contract services and preparing BoQ for tendering and tender evaluation, employer's agent, project management and scheduling, contract administration, inspection of work in progress, negotiating contracts, and contractual advice. They also engaged in cost aspects such as cost planning, budget estimating, preparing final accounts, post contract cost control, valuation, risk analysis/assessment/control, cash flow projection, financial management, value engineering, and overall advising on joint ventures. In as much as these roles are similar to their core and optional competency requirements as stated by RICS, it is evident that their roles have expanded over time to remove the negative stereotyping shown by Menaha *et al.* (2011) and Oke *et al.* (2010) where the roles would be limited and narrow scoped if not obsolete.

4.2 The Current State and Future of Quantity Surveying Profession

The survey asked the respondents about the level by which their current construction profession was rewarding and how they would rate the level of improvement of their profession in the next 10-15 years. About 35% of the respondents reported that their current profession was rewarding and very rewarding respectively. About 51% of the respondents believed that their profession would significantly improve in the next 10-15 years. Figure 1 summarizes the descriptive statistical results where the trend lines compare the satisfaction and growth variables.



	Mean	Mode	Median	Std	Skew.	Kurt.	Min.	Max.
Satisfaction	4,07	5	4	1,07	-0,9	-0,38	2	5
Growth	3,21	4	4	1,11	-0,61	-1,02	1	5

Figure 1. Descriptive Statistics of the Satisfaction and Growth of the Profession

Using a 5-point Likert scale whereby 1 = not rewarding, 2 = neutral, 3 = somewhat rewarding, 4 = rewarding, and 5 = very rewarding, an average of 4 (Mean = 4.07) was recorded for the current status of the quantity surveying profession. This implied that the professionals tended to derive relatively good level of satisfaction from their work in the construction industry. That is, they tended to get good rewards from their work as shown by their high frequency of reporting very rewarding level (Mode = 5). Using another 5-point Likert scale (1 = not improved, 2 = neutral, 3 = somewhat improved, 4 = improved and 5 = very improved), the professionals expected the profession to experience some level of growth in the next 10-15 years as shown by mode of 4 and average of 3.21, which implied a somewhat improved profession. Both predictor variable (satisfaction) and the predicted variable (growth) showed a negatively skewed distribution implying that most scores clumped up on the upper side of the rating scale. The outcome led to the conclusion that most of the quantity surveyors were satisfied with their profession and that they believed it would sufficiently grow in future.

Pooled *t*-test statistics tested the difference in average responses between the future growth of the profession and the current level of satisfaction with the profession. The *t*-test result was $t\,(28) = 20.54$, $p < .0001$. The interpretation of *p*-value is to reject the null hypothesis (no future growth of the profession) if $p < .05$ implying that there exists a significant difference in the tested statistical statement or

fail to reject the null hypothesis if $p > .05$ implying not enough evidence to reject the null hypothesis. Therefore, $p < .0001$ implied that the averages of the responses for the future growth and the level of satisfaction differed significantly and that the prediction of growth was highly dependent on the satisfaction with the profession.

Correlation and regression analyses determined the relationship and prediction level of growth of the profession from the current level of satisfaction. A correlation coefficient of 0.56 existed between the current level of satisfaction with the profession and the future growth of the profession. This index was statistically significant at $p < .05$ and was interpreted as a relatively strong positive correlation. The strong relationship implied a higher expectation of growth of the quantity surveying profession in future. Regression analysis investigated this outcome further.

Linear regression analysis predicted the future growth of the profession. In predicting the growth, coefficient of determination, R^2, estimated the amount of variance in the growth variable that was accounted for by the predictor variable (current level of satisfaction with the profession). Root Mean Square Error (RMSE) showed how far off the prediction of growth tended to be. Table 1 shows the results of the regression analysis. The y-intercept is 0.833 while the slope/gradient is 0.5833.

Table 1. Predicting the Growth of the Quantity Surveying Profession

Variable	Label	DF	Estimate	Standard Error	*t*-value	Pr > |*t*|
Intercept	Y Intercept	1	0.833	0.7006	1.19	0.2446
Satisfaction	Satisfaction with Current Profession	1	0.583	0.1667	3.50	0.0016

From Table 1, the regression coefficient (slope) for the satisfaction variable was statistically significant, [t (28) = 3.50, p = .0016]. This implies that the predictor variable had significant contribution to the predicted growth variable. In predicting the growth in the next 10-15 years, R^2 value of 0.3119 was recorded. This suggested that 31.19% of the variance in growth variable was accounted for by the current level of satisfaction with the profession variable. This percentage is high enough to warrant higher level of confidence in the predictive ability. RMSE of 0.9412 was recorded implying that the prediction of growth tended to be off by 0.9412. This was in accordance with the expectation that higher R^2 tend to be associated with lower RMSE. Regression equation (1) summarizes the results in Table 1.

$$\text{Growth} = 0.833 + 0.583*(\text{Satisfaction}) \quad (1)$$

Overall, it can be deduced from the statistically significant steep slope and strong correlation coefficient that the profession would improve in future. However, this may not imply a cause-effect relationship because there could be other confounding or extraneous factors in the profession or the construction industry that might affect such strong positive relationship or growth.

For example, tax breaks on new construction ventures or improvement in real estate markets may have significant implications. Such factors can make the professionals to be satisfied with the profession as well as being optimistic for its future growth.

4.3 Reasons for Future Growth of Quantity Surveying Profession

The respondents had different reasons behind their optimism for the future growth of the quantity surveying profession. These included:

- Economic improvement with more openings in areas such as sustainable design and construction.
- New regulations favoring the construction industry, e.g., improved ethical standards.
- Construction professionals preparing for the future as the construction industry is rising from economic downturn.
- Increase in the scope of quantity surveyors services in the challenging and dynamic construction industry environment.
- Wider international acceptance of British style quantity surveyor and even those project owners who put engineers as jack of all trades do realize that quantity surveyors provide far much better services than other construction professionals in meeting owner's needs.
- Current technological trends in IT that have helped in streamlining construction office practices thus reducing wastes and resulting in good use of resources and overall improvement towards profitability.
- Globalization is enabling QS to adopt best international construction practices.

Some of the aforementioned avenues that may favor future growth of the profession such as IT developments are akin to the outcome of the research by Smith (2004) which identified critical areas the QS needs to focus on to meet the dynamic owners' needs. Overall, the expectation of future awakening from the economic recession and new governmental rules that favor construction industry serve as a precursor for the future growth of the quantity surveying profession. In addition, the current level of satisfaction with the profession (Mean = 4.07) that is highly correlated with the growth of the profession ($r = 0.56$), the steep slope of the regression model (0.583) depicting greater level of growth of the profession, and relatively good level of coefficient of determination ($R^2 = 0.3119$) support the greater chance of future growth of the profession. Therefore, the working hypothesis of the expectation of future growth of quantity surveying profession was greatly supported.

5. CONCLUSION AND RECOMMENDATION

The focus of this paper has been to analyze the developmental trend of the quantity surveying profession by determining the satisfaction level of quantity surveyors and predicting the future of the profession in the construction industry.

This is because the profession recently experienced a meltdown and so it would be important to understand its current situation and growth in future. Qualtrics survey tool has been used to collect data from quantity surveyors where the results has shown that more than half of the respondents had over 15 years of experience in projects such as commercial and residential construction projects. The quantity surveyors offer many valuable roles in construction, and are satisfied with the current developments or trends in their profession. They believe that the future of the profession is promising. The future growth of the profession could be attributable to the expectations of future awakening from economic recession that could present avenues for advancements in areas such as IT and sustainable design and construction. This could widen the QS construction roles beyond preparing BoQ, representing employers in projects, and overall project management.

Overall, this study adds to the predictive and trend analysis studies involving quantity surveyors in the construction industry. It offers a rich source of information to construction professionals and project owners about the status and development of quantity surveying profession in future. The outcome of this research could positively affect the rate of recruitment and retention of the quantity surveyors in the construction industry since the profession is expected to grow. Thus, quantity surveyors would become confident in their continued service of providing greater value to their project owners or clients and need to continue expanding, improving, and diversifying their roles. They should maximize their potential in construction ventures in order to be reap greater benefits and improve relevance in construction.

In spite of the future developments, this research has shown quantity surveying profession to be male dominated from the very small percentage of female respondents (5%). This is a major limitation in this study since there is inequality of gender. It is recommended that further research be conducted focusing on gender equality that could propose ways to encourage more females to join the quantity surveying profession since its future growth would be invaluable when both males and females perform and benefit in relatively equal proportion. This study has also focused on the growth of the profession in the next 10-15 years. It would be worthwhile to conduct a stochastic study with a longer forecast period of say over 30 years since this is a typical projection period for most large-scale predictive research. Further research could also focus on differentiating growth among different professionals such as engineers, architects, and quantity surveyors. Each could be compared or expressed as a ratio of the total growth of the construction industry to determine their individual contribution.

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