Quantity Surveyors’ Adaptability to Technology: The Last Frontier of Job Displacement Challenge


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Introduction
The construction industry is a part of the service sector which contributes to national economic growth necessities by means of cost-effectiveness and timelines (Aibunu and Jagboro 2002; Towey 2012). The stakeholders of the construction industry are clients, operational teams and design/construction professionals who include civil, electrical and mechanical engineers, building engineers, Quantity Surveyors (QSs) and architects (Olanrewju and Anahve 2015). Hence, QSs are employed as key professionals by property developers, government bodies and government agencies, building proprietors, architects and contractors in the construction industry (Shafiei and Said 2008).

ABSTRACT
In the 21st century, where modern technologies are developed at an expeditious rate, the construction industry has survived over centuries, despite its slow rate of innovative adaptations, the poor performance of professionals, excess number of qualification holders, and vastly reported skill shortage. Technological advancement is the catalyst to solve these issues attaching extreme significance to transform the role of professionals in line with industrialisation, digitalisation and globalisation. Herein, Quantity Surveying (QS) is a key profession in the construction industry that contributes to the cost management aspect of a construction project. With the technological advancements in the industry, identifying the adaptability of QSs to 21st-century technologies and recognizing the nature of their emerging job role that may reshape the traditional role has become a pressing issue that needs to be addressed immediately. Thus, this paper investigates the potential impact of such advancements on QS employment patterns, underscoring the need for professionals to align with the shifting paradigms of digitalization. Utilizing a qualitative research approach, in-depth semi-structured interviews were conducted with ten expert QS practitioners from various international contexts. This method enabled the exploration of current states, expected competencies, and the professional evolution of QSs amidst technological disruptions. The findings suggest that while core QS functions remain irreplaceable, the profession is poised for significant transformation. This paper concludes with a range of recommendations that ensure the relevance and importance of the profession well into the future. The paper provides the international QS community with a unique data source that should prove valuable for comparative purposes and general discussion about the future of QSs globally and the direction of the profession. Therefore, this research contributes to knowledge by the diversifying QS roles in the construction industry with significant competencies encountered while addressing adaptability of QSs in the 21st century technology advancements.
Every profession evolves in response to the ever-increasing changes in the global business environment even in any kind of industry. QS is a profession that has changed over time to adapt to the changing and increasing requirements of project owners (Wao 2015). In that dynamite, the role and functions of a QS increasingly gained importance where construction projects tend to become progressively complex (Zainudeen et al. 2006). The roles of traditional QSs have changed over the years and modern QSs exhibit diversified jobs within the construction industry and beyond the limits of the construction industry (Ganiyu et al. 2012). The employment patterns of QSs are being changed due to the application of value-added services and the innovations in the information technology applications in the industry (Ashworth, et al. 2013). Further, Fanous (2012) indicated that the roles and responsibilities of diversified jobs in QS are related to the present global financial catastrophes.

As technology evolves, we are forced to evolve with it or run the risk of being left behind. The traditional way of utilising the services of a QSs has largely been at the stage of costing a design, and the production of procurement and construction documentation (Asworth and Hogg 2002). With the development of technology like Building Information Modelling (BIM) and other software, the responsibilities of professionals are starting to shift (Rathnasinghe and Kulatunga 2019).

There is no doubt that QSs’ jobs will change in the coming years with this technological development (Inscape Interiors Limited 2018). The responsibilities of QSs will be changed as some of their traditional roles will be replaced by the use of technology so that their focus will shift from bill producers to cost managers, which will shift the design process from costing to a design to designing to a cost (Shayan et al. 2019). In this condition, it is no wonder many QSs are concerned about where they stand in the future, particularly as the role of QS continues to expand (Wao and Flood 2016; Drogemuller et al. 2017). This emerges as the research problem as, “how Quantity Surveyors (QSs) can navigate the shift towards digitalization and automation that threatens traditional job roles with obsolescence?”. Therefore, this study aims to identify whether the role of the QS would be challenged due to the technological advancements in the world. The main objective of the paper is to investigate the adaptability of QSs to these technological upheavals and to identify the emerging competencies required to not just survive but thrive in this new era.

Background

Overview of Quantity Surveying Profession: Present and Future Aspects

QS is a profession that provides financial management services for projects predominantly in the construction industry. Traditional services include the preparation of Bills of Quantities including taking off quantities, Cost Planning/Budgeting, Estimating and Contract Administration (Smith 2004). The past decade has seen a marked rise in the diversification of services into non-traditional areas such as Feasibility Studies, Life Cost Analyses, Programming, Taxation Advice, Arbitration/Mediation, Expert Witness/Appraisal, Insurance Valuations, Risk Management, Quality Management, Value Management, Project/Construction Management and Facility Management (O’Brien et al. 2014; Jaafar et al. 2015; Sulaiman et al. 2016; Chandramohan 2020). In the past five years, the profession has also made significant inroads in providing cost management services to other industries such as the Petro-Chemical, Manufacturing, Mining, Aeronautical, Shipping, Transport and Civil sectors in the global context. This diversification is a result of the profession, adapting to meet changes in industry requirements.
Technological development contributes significantly to this diversified nature of the profession that supports delivering the job effectively meeting quantity and quality parameters (Derus et al. 2009). In his study, Cartlidge (2011) revealed that skills related to new technologies, added value procurement, public private partnerships, fee competitions are required to retain in the construction industry. Moreover, technology allowed developments to become faster, more accurate, and less tedious. Nonetheless, according to the author, this does not diminish the need for the role of the QS and it only means that there needs to be a change in the role during projects as time goes on. The advancement of technology in the field of QS provides more avenues for QSs to branch out with their skills (Inspcape Interiors Limited, 2018). Certainly, it has become a priority for practising QSs to understand and embrace the ever-changing technological aspects and become adaptable and agile in using these new powerful tools for their own advantage (Creamer Media, 2017).

Technological Advancements and the Quantity Surveying Practice

Although new technology intervene, QSs may possibly be necessary to collect huge volumes of data, analyse it, and then present it in a way that allows customers to make better decisions (PSR Solutions 2018). Indeed, there is an opportunity for QSs to create a niche for themselves in the market as the best people to manage the models and analyse the vast amounts of data generated by that new modelling process. As the author mentioned, the arrival of technology leaves more time free to concentrate on other areas, like advising on procurement measures or suggesting the best building materials to use. PSR Solutions (2018) further stated that with technology, QSs are now being called upon to act as advisors in a growing number of areas, including risk and value management, project financing, sustainability and even legal services. Given that an increasing number of businesses are acting as business advisors as well as QSs to their clients, it seems clear that the increase of data, and smarter technology, is going to make for a much more involved role in the future (PSR Solutions 2018). Furthermore, given the vastly improved technologies used to design and model a building, it’s much easier for QSs to choose suitable, durable and eco-friendlier materials to build with, which in turn chimes with the increasing need to develop green and sustainable building practices.

The future success of QSs relies heavily on their adaptability and willingness to evolve with industry changes. In addition, traditional skills and experience remain as sought-after by clients as ever (Highfield 2017). Mechanisation affects these skills only obliquely. Communication channels may change, but in that event, interpersonal skills will remain important, albeit with modification. From the perspective of real estate professionals, the implications are that soft skills and applied creativity in areas like customer interaction will take precedence over applied skills such as valuation that will become largely automated (Thompson et al. 2017). Nevertheless, highly automation of QS tasks might badly affect the sustainability of QS profession. As Smith (2011) mentioned, too much focus on the use of technology may lead to the deterioration of fundamental professional skills that will increasingly become necessary as technological advances continue to automate technical activities thus requiring practitioners to operate at a more highly skilled and professional level. The danger of inexperienced or incompetent staff utilising sophisticated but “user-friendly” technologies is obvious.

Susskind and Susskind (2015) argued that current professions are antiquated, opaque, and no longer affordable, and are unsustainable in an era of increasingly capable expert systems. Technology should be used to support individual tasks of QS services rather than to streamline
the tasks as a whole through automation (Chung et al. 2005). Jobs and activities in the built environment are vulnerable to this kind of technology. At the end of 2015, the BBC, reporting updated research by Frey and Osborne using UK data, presented a list of occupations at risk. They estimate that estimators, for example, stood a 95% chance that their jobs would be automated by 2035, while surveyors generally saw a 63% chance (Thompson et al. 2017). Considering this situation now is the best time to reconsider the ability of the QS profession to meet changing client needs with the technological involvement to grow the market for professional services. Based on that, there is a requirement of identifying key QS job skills and strategies to improve them with the adaptability to technology for the persistence of QS profession in the future construction industry.

The manner in which developers, designers, consultants and contractors manage the entire building process will continue to change. These changes will result in not only the substantial restructuring of how facilities are designed and supported but also a major reengineering of how these players do business. This presents the profession with an amalgam of opportunities and threats (Ashworth et al. 2013; Sonson and Kulatunga 2015; Graft et al. 2018). This technological revolution will enable the profession to raise its level of service to a much higher and professional “value-adding” level as the technical aspects of the quantity surveyor's role increasingly become automated.

Method

The study was initiated by carrying out an extensive literature review on the emerging QS role from the past decade and the role of technology in quantity surveying practice. The study required in-depth inquiry on the adaptability of QS profession to the technological era with the future directions that the profession can be evolved. Further, subjective and attitudinal information from the industry practitioners regarding the current state of QS profession in the construction industry, and the improvements for the future job role, were also required to be gathered. In addition, Naoum and Kothatri (2004) and Brikci (2007) highlighted that when the researcher’s intention is to collect the participants’ opinions and facts based on their experience and behavior then the best method is the qualitative research approach. Therefore, qualitative research approach has been selected for the study.

Since, it required the collection of factual information from practising well experienced QSs in different countries about the modern roles, competencies and skills they expect from future QSs expert interviews has been adopted as the data collection technique following the survey research strategy. Interviews can be structured, unstructured or semi-structured (Elo and Kyngas 2008). In this research, semi-structured interviews were conducted since it was essential to gather a high level of in-depth information on emerging roles and required competencies of QSs with the availability of limited respondents (10 interviewees). The experts who involved in QS practices and academia worldwide were interviewed with the need for an in-depth analysis from the industry and QS education experts. In addition, semi-structured interviews helped to identify the innovative solutions and strategies from the experts. In order to have consistency within interviewees and to enhance the validity of data, the purposive sampling method was used to select participants for data collection.
Accordingly, a total of 10 interviews were carried out comprising of three pure academics, two experts who had experience in industry and academia, two consultant QSs and two contractor QSs. Table 1 shows the profile of the respondents who were interviewed through semi-structured interviews.

The data analysis was performed through manual content analysis which is a commonly used qualitative research technique to understand text data and organising them into meaningful categories through coding (Hsieh and Shannon 2005).

Many studies indicate that bias can arise in qualitative investigations due to explicit or implicit value assumptions (Guest et al. 2012; Barusch et al. 2011). In order to minimise this situation, while improving the transparency of the work, direct quotations stated by the respondents were presented within the analysis and in the cognitive map (Figure 1).

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Country</th>
<th>Years of Experience in Quantity Surveying</th>
<th>Type of Organisation</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>United Kingdom</td>
<td>9</td>
<td>Academic and industry</td>
<td>Experience in consultancy and contractor firms</td>
</tr>
<tr>
<td>R2</td>
<td>Sri Lanka</td>
<td>20</td>
<td>Academia and industry</td>
<td>Experience in consultancy and contractor firms</td>
</tr>
<tr>
<td>R3</td>
<td>United Kingdom</td>
<td>13</td>
<td>Contractor</td>
<td>Middle east experience: 8 years. Also, experience as a consultant QS</td>
</tr>
<tr>
<td>R4</td>
<td>United Kingdom</td>
<td>17</td>
<td>Consultant</td>
<td>Experience in infrastructure projects</td>
</tr>
<tr>
<td>R5</td>
<td>United Kingdom</td>
<td></td>
<td>Academic</td>
<td>Professor in Construction management</td>
</tr>
<tr>
<td>R6</td>
<td>Hong-Kong</td>
<td>4</td>
<td>Academic</td>
<td>PhD scholar</td>
</tr>
<tr>
<td>R7</td>
<td>Sri Lanka</td>
<td>25</td>
<td>Consultant</td>
<td>Also experienced as a contractor QS</td>
</tr>
<tr>
<td>R8</td>
<td>Sri Lanka</td>
<td>19</td>
<td>Academia and industry</td>
<td>Industry experience is 10 years (consultancy and contractor)</td>
</tr>
<tr>
<td>R9</td>
<td>UAE</td>
<td>7</td>
<td>Contractor</td>
<td>Experience in consultancy and contractor firms</td>
</tr>
<tr>
<td>R10</td>
<td>Sri Lanka</td>
<td>24</td>
<td>Academia and industry</td>
<td>17 years UAE experience (consultancy and contractor)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7 years of Lecturing experience in Sri Lanka</td>
</tr>
</tbody>
</table>

Table 1: Respondent details
Results

The majority of the respondents believed that the traditional role of QSs would not change despite the changes in technological advancements. For example, R1 commented that “the role of a Quantity Surveyor hasn’t changed. It’s going to be the same role, yet the way you do the job has changed and will be changing in the future”. Similarly, R3 stated that “…QS role is not fading… but it is emerging”. One of the main reasons for the emerging QS roles has been identified by the respondents as technological advances, especially the developments in Information Technology. R4 mentioned that, with the evolution of Information Technology, the way of carrying out work, presenting, and reporting have significantly changed. R4 explained this view using one of the main traditional roles of QSs, taking off quantities. “In some of the companies, taking off quantities are now carried out by using Excel sheets instead of the traditional TDS sheets. Whereas in some companies, the trend is to use software packages such as CostX, CATO, CANDY…etc. to quantify the work”. However, R3 stated that despite the sophisticated quantity taking off tools emerge, the presence of QS shall continue as QSs knowledge and understanding is needed for quantification work. Agreeing with the above views, R7 also highlighted the importance of knowing the core competencies of QSs. R7 mentioned, “one of the main roles of QS is taking quantities according to a method of measurement… Once you know these basics, it is very easier for you to adjust yourself, even to do the hard roles”. However, with the influence of various factors such as technology, knowledge requirements and way of performing duties, the role of the QSs will continue to change, commented R7.

In addition to the above, R1 stated “people with other expertise might take over some of the technical roles that can be performed by QSs such as BIM specialists…however, the key roles will remain with the QS”. Opposing to this, R5 and R8 affirmed QS could have more prominence as project coordinators. R8 supported this further by stating “with the introduction of BIM, QSs need to evolve with the trending requirement of integrated project management concept… Out of all the construction stakeholders, QSs are the most suitable candidates to take over the BIM manager’s role as they are in the project from A to Z”.

R5 highlighted the importance of financial reporting project-wise as well as organisation-wise as a statutory requirement. R5 further explained that in many cases when financial reporting becomes a statutory requirement, such duties are carried out by accountants. However, R5 shows that QS is more competent to perform this task. On the other hand, there are modern software packages that link the procurement software with the project cost management system. As QS has both these expertise, it is further evident that QSs have better scope in preparation of management financial reporting.

R8 gave an important perspective regarding the changing roles of QS. According to R8, the changes in the QS role would mainly govern by the territory and the level of development in the country’s construction industry in terms of technological aspects. “In the countries with more technological advances, QS will have to have more competence with technological roles such as BIM” mentioned R8. Despite all the advances in technology, R1 was confident that the role of QS would not change. “With the new technology such as BIM, Augmented Reality, Drones, 3D Scanning, Industry 4.0, Industry 5.0, Construction 4.0, work will be faster and more accurate…yet the role of the QS would still exist…of course some aspects would be automated”. Similarly, R2 highlighted the automation of certain QS tasks saying “Although automation happens the QSs role will be highly valued with regard to knowledge and understanding on the method of measurement and forms of the contracts”. R2 further affirm that without this expert knowledge, the contract execution stage can be difficult.

Few of the respondents mentioned the need of maintaining in-house cost databases to get the most appropriate rates for projects. Modern software has made this easy with various
filtering options, sorting, evaluating, storing and improved security levels to maintain data confidentiality. However, despite the existence of these continuously developing database management software packages, R8 stated that the QSs will still have to provide cost intelligence for accurate predictions and analysis of inflation rates, indices, etc. Another reason mentioned by the respondents for the need for QSs in the new technological era is the need for critical thinking, the ability of logical reasoning and practical decision making which cannot be replaced by modern technology. For example, R3 highlighted the presence of QS role explaining, “INTEND, BRAVO are some of the software packages which do procurement, but unable to do evaluations when selecting the most viable appraisal using a multi-criterion approach”. R3 said, “As contracts in some parts of the world are governed by higher regulatory bodies such as EU union, complying with their rules and regulations is a must”. In this regard, R3 stated that QSs would have a better scope as procurement managers especially due to the post-contract knowledge they have. R3 further stated that quality evaluations and financial evaluations carried out by QSs cannot be performed with technology. Confirming the need for human decision making, R3 mentioned that “in the construction industry, we need to make subjective judgments and practical decision making, which cannot be carried out by technology”.

Although the applications are developed to use artificial intelligence in evaluating the parameters, a human touch is indeed necessary while making important decisions. For example, a decision after a tender evaluation is critical and is one of the most important recommendations made by the QSs. Even though sophisticated software, e-tendering portals exist today, these applications haven’t been able to replace the role of the QS. Agreeing with this, R3 mentioned that “…estimation is an art, not a science. With the introduction of BIM, there could be fewer opportunities for quantification, but cost intelligence will be needed for pricing, verification and application of what is resulted”. Agreeing with this, R3 mentioned that “…on the ground, there are constraints that could differ from the theoretical perspectives…for example, diversions and traffic management carried out on sites needs human intuition which cannot be replaced by the technology”. As opposed to the above views, R7 commented that Artificial Intelligence could replace the critical thinking of QSs up to a certain extent while performing day-to-day tasks. Hence, R7 asserted that “we need to improve critical thinking ability to adapt as specialised cost managers”. For example, despite the availability of the most sophisticated types of software for the preparation of tender adjudications, QS is still required to logically input the instruction so that the software can perform a task to give meaningful information. Again, the recommendations have to be influenced with a human touch as parameters such as past relationships, recent changes of the organisational hierarchy, accuracy and sensibility, dealing with anomalies and Key Performance Indicators (KPIs) of the previous projects cannot be spotted by mere advancement of the software. An automatic robotic answer could be way far from the most viable option in reality. This is mainly because the software understands certain logics inputted and the numerical values. The qualitative input would still definitely be needed.

Figure 1 demonstrates the cognitive map related to the analysis with the key constructs and their potential relationships which will be discussed in the Section 5.
The cognitive map provided illustrates the multifaceted nature of the QS’s role in the construction industry, amidst the integration of technological advancements. Accordingly, this cognitive map delineates the QS role as one that is intrinsically adaptable, expanding, and increasingly integrated with technological advances while maintaining its foundational expertise and critical thinking capabilities.

**Discussion**

The study investigated the impact of technology towards the job role of QSs in future and the way that the QS job role should be evolved in order to maintain the demand of the profession along with the technological advancements without letting it to be deteriorated. It was revealed that despite the advancement of technology, the traditional role of the QS will continue to exist in the construction industry. However, the way of carrying out the job role continues to change with emerging technological advances. Explicitly, technology makes the tasks of each QS role easy and faster while reducing the amount of time spent on basic functions. Further, even though the procedure of performing the task, way of presenting and required level of knowledge have been changed with the impact of technological advancements, the core of each role has not been changed and cannot be overruled. Acknowledging this, Ofori and Toor (2013) pinpointed in their study that the QS profession should develop expertise in their core competencies while developing technological investments, diversifying and broadening the range of services they offer and ensuring that their knowledge and techniques evolve with the key developments in the technology.

When discussing the development of core competencies, the key roles of QSs such as quantification, pricing, variation management, costing, documentation, tendering, feasibility studies will continue to exist despite the technological advancements. The importance of knowing the core competencies of QSs will remain the same, as it would influence them to adjust to any new/challenging circumstances easily. Even in the new technological era, the need for critical thinking, the ability of logical reasoning and practical decision making of QSs will secure their role in the construction industry. Human skills and associated cognitive functioning make QSs irreplaceable regardless of the presence of artificial intelligence (in evaluating certain parameters related to quantity surveying role), availability of advanced software packages and e-tendering portals. This is because, some of the core quantity surveying roles such as estimation, tendering, and cost controlling are not theory-based, but practice-based and demand subjective judgments and cost intelligence, which cannot be replaced with technological advancements. Logical instructions feeding for software to perform the tasks, providing vital information such as past relationships, Key Performance Indicators (KPIs) of previous projects as part of the decision making process and cost intelligence, and, literally dealing with any sort of anomalies will be difficult to perform despite advancements in technology, hence the QSs role in those circumstances will remain unthreatened. Nevertheless, maximising the value for the traditional role of QS in this technological era has been seen as the best priority by Klein (2017) and suggested that the market value for these core competencies can be enhanced when dealing with less innovative clients with fewer time constraints, that unintentionally contribute to charging more for the traditional services.

On the other hand, even in a situation when a job role has been replaced by technology, still a part or task of that role requires QSs’ assistance in terms of making retrieved data meaningful to obtain informed decisions. In order to perform the roles like understanding client requirements, decision making in qualitative and sensible aspects, partnering and in the situations where sensible decision making is required, the role of QS is essential. Even in the new technological era, the need for critical thinking, the ability of logical reasoning and practical decision making of QSs will secure their role in the construction industry.
Empirical evidence shows that there will be room for emerging roles for QSs resulting from the advancement of technologies, where QSs can well fit in. These roles cater innovative directions for QSs where they can master their expertise by broadening the range of services to the construction industry. Accordingly, the new roles in the emerging environment as per the findings are quality and time management, project planning, delay analysis, communication specialists in larger projects, law and dispute resolution, green building, Life Cycle Costing (LCC), and building services, academic, building finance management/accounting, IT specialist, BIM management, procurement management, financial reporting, cost database management, and Engineering and Construction Contract manager’s role. As described by Al-Maatouk and Othman (2018), since QS as a profession covers a vast range of skills in the areas of communication, creativity, decision making, documentation, collaboration and team working, problem-solving, it is evident that QSs are the best professionals who can successfully perform aforementioned roles in the industry. Therefore, QSs have an added advantage in performing these novel job roles compared to the others. To this, it is essential to inculcate the required skills and knowledge within the QS graduates and practitioners properly without letting the other substitute professions grab the opportunity.

In addition, with the futuristic technology trends related to BIM, Augmented Reality, Drones, 3D Scanning, Industry 4.0, Industry 5.0, and Construction 4.0, QS’s work will also be faster, innovative and more accurate. Supporting to this, Muzvimwe (2011) appreciated that these technologies raise the value of QS services by providing the ability to predict, simulate and explore the impact of different design and construction scenarios through the integration of cost data, quantities and project programmes. While greater efficiency is granted, these advancements of technologies will demand higher quality and accurate performance from the professionals. In order to cater to such industrial needs, QS’s traditional role could thrive and cope with them. For example, with the introduction of BIM, QSs will get more opportunities to work in integrated project management environments and to perform a diversified role as BIM managers due to their involvement in a construction project throughout the entire contract duration. Under these circumstances, common data management and data handling would become paramount. To facilitate these needs, there is various software used in the contemporary industry from simple document management to fully integrated project management. QSs have to ponder more on quick learning, team working and adaptability to perform these software packages successfully. However, Mayouf et al. (2019) have argued that QSs and new graduates should have the proper training to integrate these types of software creating an added burden for the construction firms and academic institutions due to cost and time implications.

On the main, it can be deduced that with the advancement of technology, none of the traditional job roles of a QSs will disappear with the time being yet improvements with regard to procedures or way of performing could take place. However, there is a competition in the industry, for the innovative job roles emerged from the technological improvements that are more suited to the skills and competencies of QSs. Therefore, QSs need to strengthen their skills and competencies to promote a high standard of service in the profession while safeguarding the traditional job role and exploring new job roles with the technological development in the industry. Further, innovativeness, quick learning skills, self-learning and knowledge on computer-based quantification and costing are imperative to play the future QSs role successfully whilst keeping in line with the evolving technology.
Conclusion

Information-related technological advancement has widely been acknowledged as a potent tool for accelerating economic growth and thus bridging the gap between developed and developing economies. Most importantly, because of the indispensable contributions of the construction industry to the development of economies, the usage of Information and communication-related technology in the industry is more important than ever. In a QS firm that is striving to achieve accuracy, technologically advanced tool usage has become very imperative.

The focus of this paper has been to analyse the developmental trend of the QS profession by determining the technological advancement towards QSs 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 the future. The investigation reveals that more than half of the respondents had over 5 years of experience locally and overseas as well. The QSs are offered 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 the economic recession that could present avenues for advancements in emerging areas of the profession. 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 QS in the international market of construction industry. The respondents offered a rich source of information to construction professionals and project owners worldwide about the status and development of QS profession in the future. The outcome of this research could positively affect the rate of recruitment, the birth of new QS job roles and retention of the QS in the construction industry since the profession is expected to grow. Thus, QSs 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 maximise their potential in construction ventures in order to reap greater benefits and improve relevance in construction. At the same time, the skills and competencies of the QS are also required to be improved and adapted with the emerging job roles in the near future as investigated through the research.

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 and Architects. 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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