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Digital Transformation in Quantity Surveying: Where Lies the Issues?

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ABSTRACT

Most industries are embracing digitalisation as a result of the fourth industrial revolution. However, the construction industry has lagged in this bid as it only recently embraced technological innovations. In recent times, quantity surveying firms are continually adopting technological innovation in their work practices. The current study will provide relevant knowledge about the impact of digitalisation within quantity surveying firms in South Africa. Hence, the study explores the stumbling blocks to digitalisation in quantity surveying. Data for the research was gathered through a survey of professional quantity surveyors working in South Africa. Theoretical review highlights that the value added by digital transformation greatly outweighs the problem, hence the need to ensure that the quantity surveying profession is fully digitalised. Theoretical findings classified the barriers to digital transformation in quantity surveying four significant categories; personnel competency, cost and affordability, data and cyber security issues and stakeholders concerns. Empirical findings rank the barriers in the order of impact as follows: first - cost and affordability, second - personnel competency, third - stakeholders concerns data and last - cyber security issues. These costs include the cost of purchase, installation and operation of digital tools, as well as training and development of staff to deploy digital transformation within activities and processes. Finally, it is recommended that governmental and professional institutions support the digital transformation in funding, educational reforms and sensitisation programmes.

Keywords: Digitalisation, Quantity surveying, Digital quantity surveying, Digital transformation, Digital construction

STUDY BACKGROUND

Digitalisation involves using digital technologies and their ability to connect people, devices, and data to improve and transform business processes (Day and Schoemaker, 2016; Adesi, *et al.*, 2018). Digitalisation has the potential to transform the whole construction industry. The construction industry can encompass organisations and companies involved with civil engineering and building (Brewer, Gajendran and Chen, 2005). According to, Adesi, et al., (2018), digital technologies are predicted to influence the organisational process for 93% of construction firms. This influence is associated with integrating robotics, IoT sensory networks, automation for organisational and operational processes in construction firms. New-age technologies will

enable efficient collaboration amongst stakeholders through a better visual understanding of building artifices (Oke, *et al.*, 2018).

Quantity Surveyors are essential stakeholders of the construction and design teams in both the public and private sectors. Around the world, quantity surveying firms are gradually adopting innovative technology in work practices; however, its effects on service delivery have not been analytically verified (Musa, *et al.*, 2010). Digitalisation is transforming the roles of the quantity surveying profession, improving their performances and the economic use of resources in the construction industry. Quantity surveying professionals are currently utilising digital technologies to assist them with various activities such as measuring construction works to ensure precision and accuracy. However, the role of the quantity surveying profession is moderately dependent on senior management's decisions to utilise the available digitalisation tools (Adesi, *et al.*, 2018).

Quantity surveyors are required to adapt to changes in work patterns to increase their efficiency to develop new markets, uphold a competitive advantage, and increase profitability through digitalisation. The current study provides relevant knowledge on digitalisation within quantity surveying firms in South Africa and its overwhelming benefits. The study explores the hurdles to be scaled by QS firms when implementing digitalisation.

METHODOLOGY

The theoretical review of this study surveyed the digital transformation in the building industry, exploring the distinctions between current and evolving skills needed to remain relevant in the futuristic building industry characterised by digital transformation. Given the aim of the study, the research was streamlined into a descriptive study, thus the survey method was deemed appropriate for collecting the primary data. The research adopted a quantitative model and thus a five-point Likert scale structured questionnaire was designed and used as the medium of collecting primary data with the sole purpose of achieving the aim of the study. Primary data was sourced from building industry firms in South Africa through an online questionnaire. The retrieved questionnaires were analysed using descriptive statistics and presented in terms of their ranked mean item scores in the succeeding section of this paper. In addition to the descriptive analysis, the Pearson Correlation was used to establish the connections between the current skills and the evolving skills in the building industry.

QUANTITY SURVEYING: THE PROFESSIONAL ANGLE

According to Reddy (2017), the concept of quantity surveying can be traced back to when personnel were explicitly dedicated to complete estimates and costs for incredible and magnificent structures in the Egyptian civilisation. It then emerged as a new profession in 1836 when the new Houses of Parliament of Great Britain requested bids for the first public contract. The contract which Sir Charles Barry designed was the first to be completely measured and tendered using Bill of Quantities (BOQs) with amounts of money allocated to

related responsibility (Reddy 2017). Quantity Surveyors get their name from the Bill of Quantities (BOQ), a document where quantities of a construction project are itemised. These quantities found in a BOQ are measured from design drawings utilised for contracts intended on tendering and for progress payment, for variations as well as for changes and eventually for statistics, taxations, and valuations (Hodgson, *et al.*, 2020).

In general, the QS profession ensures that the assets of a construction project are used to the best point of interest of society by providing the most economically monetary administration for activities as well as providing consultancy services to the client, builder and planner during the construction process (Murphy, 2018). The quantity surveying tasks include procurement, cost management and contractual issues in the supply chain and marketplace. Worldwide, quantity surveyors are also called 'Construction Economists' or 'Cost Managers' (Reddy 2017).

Quantity Surveyors advise on cost implications based on the client's requirements and the other stakeholders' decisions. They also monitor and revise initial estimates and contractual agreements as the construction progress based on additional works and variations (Olanrewaju and Anahve 2015). Some of the traditional services a quantity surveyor offers include preliminary cost advice, cost planning, feasibility estimates, advice on selection of consultants and contractors, preparing of tender documents, advising on contractual methods, evaluation of construction work, project management services, periodic financial reporting, tax deduction services, technical auditing, and feasibility estimates. The more modern services quantity surveyors offer is asset advisory, facilities consultancy, building surveying, risk mitigation and due diligence, litigation support and property taxation (Reddy 2017).

DIGITALISED QUANTITY SURVEYING: BENEFITS TO BE ACCRUED

Currently, the construction industry faces a paradigm shift from traditional paper-based information to digitally-based information exchange. Industries such as banking, manufacturing and aircraft have long adapted to this shift and have been benefiting from this shift ever since (Agyekum, *et al.*, 2015). These digital technologies help various activities such as measuring construction works with accuracy and precision (Adesi, *et al.*, 2018).

Reddy (2018) recorded some benefits of digital transformation of the QS profession. These benefits include reducing overall cost, reducing human error, reducing time spent on the job, reducing rework, increasing accuracy in measurements, and easy calculation verification. Digital technologies also benefit quantity surveyors by increasing their productivity through streamlined data entry and management and increasing their productivity by utilising digitisers for eliminating measurements in many areas. By directly extracting quantities from CAD files, quantity surveyors increase productivity through automated quantities and cost estimation (Tan and Yeoh, 2011). Similarly, digital tools help reduce data processing and communication information with other professionals and, ultimately, improve communications regarding effective decision making and coordination within the construction project,

including all stakeholders (Agyekum, *et al.*, 2015). Using digital technology, quantity surveyors will work more efficiently, thereby maximising productivity and lower costs, resulting in a higher return on investment. Productivity and profitability are closely interconnected, and if a firm faces a reduction of productivity, they consequently are vulnerable to a loss in overall profits. The construction industry suffers from the inability to maximise productivity for better profitability. However, the more effective use of innovative technology could solve this problem (Choudhary 2019).

Ashworth, Hogg and Higgs (2013) further highlights the other advantages of digitalisation in the QS profession: reduction in time it takes to produce BOQs, improved accuracy of cost estimates, automated taking-off and BOQ production, and improved collaboration between stakeholders. In retrospect, digitalising the QS professional activities improves the overall efficiency within the profession. There is an increasing impact of technology on all professions within the building industry, and quantity surveying is no exception. Newer processes like BIM have become a norm in the industry and has led to the expansion of Quantity Surveying roles (Merschbrock and Munkvold, 2015). When new methodologies and technologies continue to flood industries, quantity surveying professionals need to identify the most useful tool to automate tasks and improve efficiency while reducing costs (Anderselite, 2020). As an added benefit, collaborating on construction will allow all parties involved to communicate and stay in touch throughout the project. The use of digital technology will improve the project's clarity because it tracks how information is shared among the various stakeholders involved in the project, thereby reducing the likelihood of confusion and lack of clarity (Choudhary 2019).

WHERE LIES THE ISSUES?

The construction industry accounts for 6% of global gross domestic product (GDP), and its activities are associated with almost every other industry. And for all other industries to function seamlessly, they require constructed buildings, structures, or assets. Digitalisation is an essential source to develop, transform and optimise the construction industry (Ibem and Laryea 2014). Even though software helps the quantity surveying profession become easier by facilitating decision-making, improving the firm's public image, and increasing productivity using cost calculations and automated quantities, some challenges have been identified associated with the implementation (Olatunji 2015). Olatunji (2015) further argued that one of the challenges of software application on project delivery is laziness. The study stressed that software usage had made professionals lazier in that simple arithmetic and other paperwork has been eliminated by software that does the work faster and more accurately. During digital transformation, other challenges that firms face include inadequate education and training in IT tools and a high cost of learning about new technologies (Agyekum, *et al.*, 2015). Most tertiary institutions do not offer specific modules for digital training, which would ultimately be the burden of firms and companies to train their graduate employees (Oke, *et al.*, 2018).

Table 1. Digital transformation barriers.

Barriers	Mean	Std. Deviation	Rank
High cost of training employees	3.68	.848	1
Excessive cost of operating digital tools	3.61	1.013	2
Inadequate training and education by universities	3.61	.978	2
Inadequate digital competency of staffs	3.58	.865	4
QS firms lack of affordability	3.49	1.054	5
Lack of managerial desire and support	3.46	1.070	6
Fear of technology replacing quantity surveyors	3.40	1.208	7
Firms are too small to embrace technology	3.37	1.096	8
Complexity of digital tools	3.37	1.175	8
Laxity due to increased automated tasks	3.28	.978	10
Lack of accessibility	3.25	1.023	11
Data security and privacy concerns	3.19	1.156	12
Risks of downtime due to viral attacks	3.05	1.260	13

Haupt (2016) argues that the roles and responsibilities within the building industry will change immensely, and the QS profession may become redundant. Digital transformation may threaten services traditionally provided by quantity surveyors. This has led quantity surveying firms to resist introducing and adopting new technologies. Another barrier to digital transformation is a poor return on investment. The high cost of implementing these technologies has also been a barrier to adopting technologies and software usage in QS firms. (Agyekum, *et al.*, 2015). In another light, Dithebe, et al., (2018) highlighted that most clients within the industry are reluctant to approve new and improved building techniques and creative building contexts that could positively and efficiently contribute to the improvement within the construction industry. More challenges of digital transformation identified include the fear of cyber-attacks, a lack of management desire for implementation, the complexity in usage, data security and privacy, lack of accessibility and the high cost of running these tools (Oke, *et al.*, 2018). Table 1 presents the results from the study and ranked the barriers of digital transformation.

IMPLICATION OF FINDINGS

Theoretical findings from this study reveal that the barriers to digital transformation in quantity surveying can be classified into four major categories. The first is personnel competency, number two on the list is cost and affordability, the third is data and cyber security issues and lastly, stakeholders concerns. Empirical findings show that out of the four categories of barriers identified in the literature, the most impactful is cost and affordability, including the cost of training employees and the operating cost of digital tools as the top two barriers. The other cost barrier relates to affordability issues on the QS firms' side. Personnel competency, which is the second most impactful category, encompasses inadequate university education, digitally incompetent staff, and the complexity of digital tools. Two out of the three barriers in this category are top four on the barrier list. The third barrier

category revealed by the study is stakeholders' concerns, which encompasses inadequate support from top management, fear of bots replacing quantity surveyors, size of firms, laxity of professionals, accessibility issues, and insufficient potential return on investment. Finally, the last category of barriers is data, and cyber security concerns and empirical data show that both issues are not huge barriers for digital transformation in QS firms.

In resolving the cost issues faced by the transformation, companies have to rely on governing bodies and authorities to provide support regarding the implementations in terms of funding programs and collaborative partnerships. Also, part of funding must be used to develop personnel competencies both during and after university education. In addition, curriculum reforms must take place in QS education in response to the digital transformation. Adequate sensitisation programmes must be carried out by professional institutions, associations, and bodies to address stakeholders concerns and digital security issues.

CONCLUSION

Quantity surveyors are required to adapt to changes in work patterns to increase their efficiency to develop new markets, uphold a competitive advantage, and increase profitability through digitalisation. The current study seeks to provide relevant knowledge on digitalisation within quantity surveying firms in South Africa. Theoretical review highlights that the value added by digital transformation greatly outweighs the problem, hence the need to ensure that the quantity surveying profession is fully digitalised. Theoretical findings classified the barriers to digital transformation in quantity surveying four major categories; personnel competency, cost and affordability, data and cyber security issues and stakeholders concerns. Empirical findings rank the barriers in the order of impact: first - cost and affordability, second - personnel competency, third - stakeholders concerns data and last - cyber security issues. Finally, it is recommended that governmental and professional institutions support the digital transformation availing funds to lessen cost burdens on stakeholders, reform the education curriculum to accommodate the digital transformation, and organise sensitisation programmes to unburden stakeholders on risk concerns.

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