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INFORMATION TECHNOLOGY (IT) FOR STRATEGY FORMULATION IN IRISH QUANTITY SURVEYING FIRMS: A LITERATURE REVIEW

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ABSTRACT

The purpose of this study is to provide a critical review of existing studies on strategy to demonstrate the influence of information technology on strategy formulation in quantity surveying practices in Ireland. The paper focuses on the influence of IT on the strategic planning and decision making process of QS practices in Ireland. A key finding from the study supports the potential to apply dynamic capability theory emanating from the Resource Based View (RBV) of the firm to construction Professional Service Firms (PSF's) in Ireland. The framework presented in this paper has the potential for advancing future research agenda focusing on the development IT capabilities QS practices. In addition, the framework is timely for developing competitive advantage of QS practitioners operating in dynamic environments under the influence of ever increasing IT disruptions. The study extensively relies on the critical review, analysis and synthesis of existing studies in strategic planning in construction; information technology to develop a conceptual framework focusing on IT for strategy formulation in QS practices to create competitive advantage.

Keywords: information, quantity, strategy, surveying, technology.

INTRODUCTION

According to Long and Long (1997) Information Technology (IT) is the integration of computing technology and information processing and has contributed hugely to diverse processes in construction, such as project costing; planning and scheduling and design (Shen and Chung 2007). The significance of IT in construction project delivery has been determined in several international studies, including in Singapore (Betts, et al. 1991), UK (O'Brien and Al-Soufi 1994), New Zealand (Doherty 1997), Hong Kong (Futcher 2000) and Malaysia (Lim, et al. 2002). However, there has been limited discussion pertaining to the strategic use of IT to achieve corporate objectives in Irish Quantity Surveying (QS) practices.

The following sections provide a critical analysis of the multi-faceted components of strategy formulation in construction, followed by a review of the existing knowledge pertaining to the strategic use of IT in Irish QS practices. An important contribution of this research is the framework presented in figure 1 of this paper demonstrating the interrelationship among practice dynamic capabilities, turbulent environment and IT for strategy to guide top management in QS practices during strategic planning process.

CONTEXT

According to Mintzberg (1994), strategic planning is the programming, articulation, elaboration of missions and visions and their implementation in organizations.

Strategic planning has been widely applied in various organizations including construction firms. Within Construction Professional Service Firms (CPSF's), evidence suggests that practitioners acknowledge the need to act strategically in order to survive within a turbulent industry and thus are actively engaging in strategic planning process (Murphy 2016).

Existing studies establish relationship between strategic planning and performance in several industries including construction (Oyewobi, et al. 2015; Kale and Arditi 2003). Specifically, Li and Ling (2012) found a positive correlation between strategic planning and profit maximization in construction firms. Miller and Cardinal (1994) establish the relationship between strategic planning and organisational performance but it has not been specifically investigated in Irish construction CPSF's.

The Irish construction industry has undergone a period of rapid transformation in the last decade, ranging from unprecedented growth to severe recession and now strong growth (AECOM 2017). CPSF's operating within this dynamic environment must identify mechanisms by which they may differentiate their services in order to secure sustained competitive advantage (Murphy 2013).

CPSF's are highly knowledge intensive and as such are competing based on an intangible component of the construction process (Jewell, et al. 2010). The importance of the heterogeneity of skills and resources available to firms forms the basis of a large body of research within the strategic management domain, known broadly as the Resource Based View (RBV) of the firm (Barney, 1991). The RBV puts forward the proposition that a firm may gain sustained competitive advantage over rivals, based on the unique combination and utilisation of internal resources. A related concept to RBV lies in the core competencies held of the firm. Core competences relate to a number of competencies, skills and knowhow possessed by a firm that enable them to compete effectively within the marketplace. The seminal work by Prahalad and Hamel (1990) suggests that firms should possess a diverse suite of core competences in order to maintain competitiveness over time. Core competences do not necessarily diminish or deteriorate over time but may require nurturing and protection to safeguard from imitation or obsolescence, particularly in the competences of knowledge and skills.

Knowledge and skills are an integral measure of core competences, and thus are vital to CPSF's, including QS practices. Prahalad and Hamel (1990) extend the function of core competences by relating to collective learning and coordination of different forms of skills by integrating diverse forms of technologies.

With respect to the Irish construction sector and in particular QS CPSF's, the integration of technology as a core competence in pursuit of competitive advantage (Torkkeli and Tuominen 2002) remains underexplored and warrants greater consideration. This is particularly important given the changing nature of the construction industry and the global economic environment, within which construction firms operate.

The ability of a firm to react, respond and utilise resource availability for competitive advantage within a changing environment is the basis of the theory of dynamic capabilities. According to the seminal research published by Teece, et al. (1997), dynamic capabilities focus on the ability of firms to assimilate or integrate, build and

reconfigure internal and external competences to adapt to a changing business environment. A firm's dynamic capabilities create synergies through absorptive, adaptive innovation and networking capabilities, leading to identification of opportunities for competitive advantage (Parida, et al. 2016). The importance of organisational and resource flexibility within Irish QS practices has been noted (Murphy 2013), however, IT resources as a dynamic capability within Irish QS practices has not been systematically scrutinised. Potential benefits of IT capabilities for Irish QS practices include internal efficiencies; initiation and sustenance of external collaboration and internal and external communication (Eadie, et al. 2010). Firms must develop their dynamic capabilities, including IT, to form the nucleus of the required core competences to remain competitive within a turbulent environment.

IT- driven strategy formulation

According to Piccoli and Ives (2005), IT-dependent strategic initiatives require information systems to create economic value and strategic objectives for competitive advantage. Thus, Irish QS practices need to adapt using IT and digitisation as key drivers for developing strategic objectives and initiatives in a dynamic business environment. Earlier studies also emphasise the role of IT in formulating strategies that lead to sustained competitive advantage (Porter and Millar 1985). These studies found the requirements for IT driven strategy formulation as differentiation: data warehousing and mining; channel domination and improvement of efficiency (Sethi and King 1994) which are suitable for drivers for strategic planning process to create competitive advantage.

According to Porter (1985), competitive advantage has to be protected against erosion by competitors to prevent imitation of strategies formulated. The RBV supports the sustainability of competitive advantage by making replication of the value creation strategy formulation difficult. Within the context of IT resources, there are a number of challenges in terms of sustainability of advantages in this regard. Thus, Piccoli and Ives (2005) identified four main barriers for sustaining IT strategies, including; IT resources barriers; complementary resources barriers; IT project barriers and pre-emption barriers. In view of the disruptive nature of the current business environment, CPSF would have to modernise by using IT and digitisation for strategic planning, developing dynamic capabilities that address the barriers identified by Piccoli and Ives (2005).

IT in Irish QS practices

QS practice is changing and the use of IT forms an important aspect of this evolution. Smith (2011), argues that IT is fundamental to the competitive advantage of quantity surveying firms. The IT revolution has brought significant changes in professional service firms, especially in cost planning and management (Weisburg 2000). These changes include automated quantity take off; reduced errors and omissions and quicker measurement (Society of Chartered Surveyors Ireland (SCSI) 2017, SCSI 2014).

The Irish construction industry has witnessed the development and widespread use of IT applications such as the numerous applications in Building Information Modelling (BIM) (Duffy, et al. 2007). The use of IT in the Irish construction sector including QS practices has been increasing (Keavney, et al. 2013). Matipa, et al. (2009) outlines a

number of useful software applications in Irish QS practices. In spite of the advantages of these applications, Matipa, et al. (2009) note user weaknesses utilising these applications. They indicate construction software requires personnel competence in order to realise their potential in Irish QS practices. This implies QS practices would have to develop their IT capabilities by harmonising the various resources in their environment, internally and externally. Other critical studies from an Irish perspective include; effective communication utilizing BIM for end user satisfaction (McAuley, et al. 2015); whole life costing leveraging BIM data (Kehily, et al. 2013) and BIM usage among professional QS practices in Ireland (SCSI, 2017, SCSI, 2014) These studies demonstrate the increasing IT revolution occurring in the Irish construction industry, especially in QS practices.

According to Smith (2011), investment in IT in QS practices involves three main phases, comprising of:

1. Automation: using IT to automate technical and specialist tasks
2. Value addition: improves the information management systems of QS firms by linking electronically with other partners of the construction supply chain
3. Business process reengineering: the use of IT to transform the core business processes operations of firms.

In spite of the benefits of IT and its potential in transforming the construction industry and QS practices, existing studies have acknowledged that business process re-engineering, is seldom applied in practice (Smith 2011). Smith (2000) notes that IT enhances value-added services and business diversity in QS practices. However, Akinnagbe and Adelakun (2014) outline that there is limited use of measurement software in QS firms, such as WinQS 32; Masterbill and QSPlus. Similarly, a subsequent study by Agyekum, et al. (2015) also confirmed limited use of software tools in QS practices. Though these studies highlighted the application of IT software in QS practices, emphasis on using these IT applications for strategic planning and implementation have not been discussed. It is therefore necessary to consider investigating key issues relating to IT for strategy in construction, to address the disruptive business environment created through modernisation of operations.

The threats to optimum use of IT software in QS practices are numerous. For instance, Matipa, et al. (2009), identify key challenges resulting in sub-optimum use of software including low fees; unsatisfied clients; over reliance on software leading to weakening technical capabilities; increasing demand for sustainable construction and the amalgamation of computer software instead of streamlined approaches. However, enhanced IT strategy formulation in Irish QS practices may lead to service innovation and quality (Crowley 2013).

Considering the benefits of IT to business management, QS firms should develop IT strategies that fully integrate the potentials of IT and digitization to ensure value for services provided to clients and potentially generate competitive advantage based on this dynamic capability. Thus, a conceptual framework integrating key aspects of IT, QS practices and dynamic capabilities would create competitive advantage.

MAIN DISCUSSION

There is a growing body of knowledge on strategic planning in construction firms including QS practices in the UK (Jennings and Betts 1996) and Ireland (Murphy 2013). The turbulent environment within which Irish QS practices operate has driven firms towards a more systematic approach to strategic management (Murphy 2016). A critical element for any CPSF to survive is the ability to create, exploit and nurture internal and external competencies, such that they are capable of competing within a dynamic environment. While there is convincing evidence emphasising the importance of human resources, by contrast, there is less emphasis on the strategic use of IT as a dynamic capability in construction CPSF's.

The formulation of IT strategy for QS practices involves the interconnectivity and interplay of several components. Each component must be considered in such a way as to maximise dynamic capabilities in a changing technological environment. The attainment of technological capabilities contributes significantly to sustained competitive advantage through differentiation of service delivery.

This paper proposes a framework that considers critical interactions of IT, dynamic business environment and CPSFs in figure 1 below.

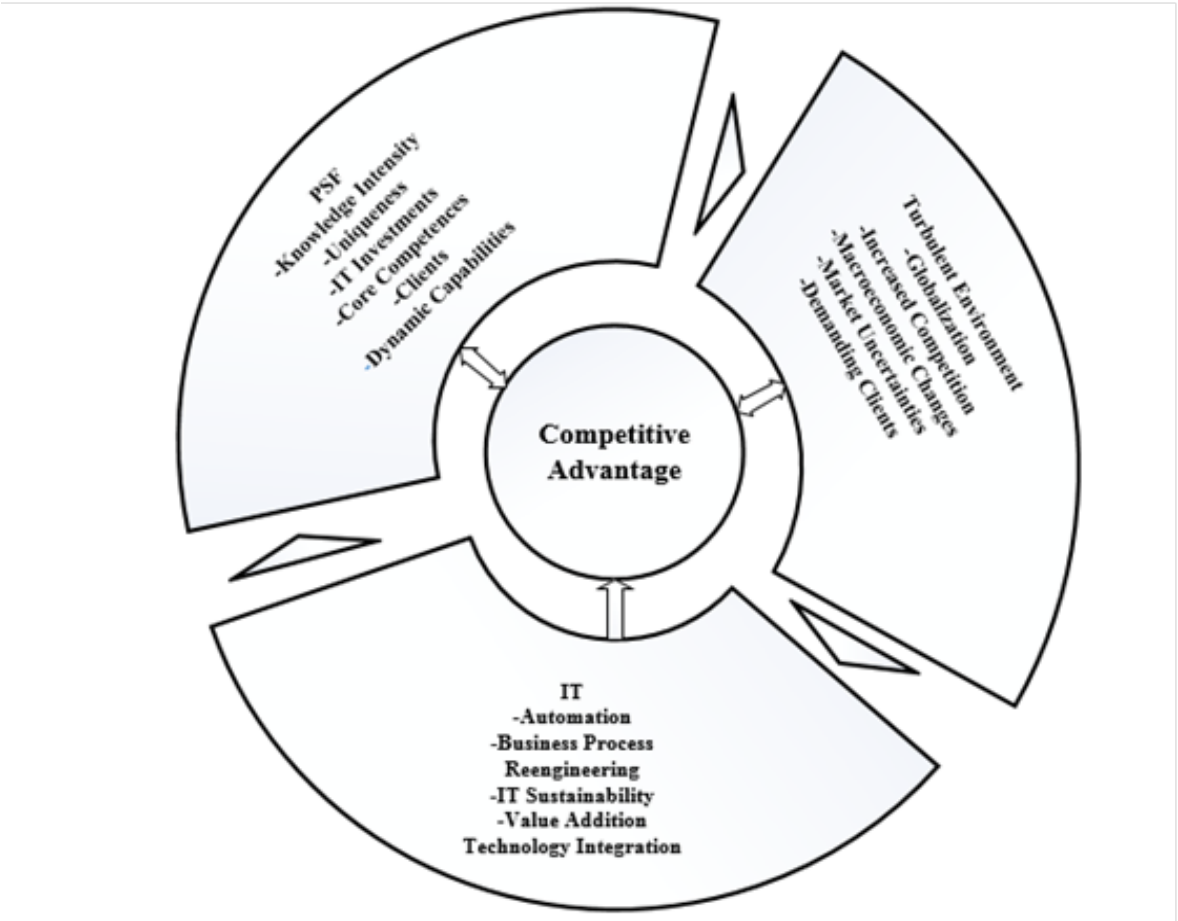

Figure 1: A Framework on IT for Strategy in Quantity Surveying Practices

Analysing Figure 1 above, IT for strategy in professional QS practices should consist of three main components; the professional services firms; the turbulent environment;

and IT. The CPSF component of the IT for strategy influenced internal factors within QS practices, which comprised of knowledge intensity; uniqueness in terms of service delivery and client relationship. Other internal factors, which the strategist should consider, include core competences of professionals; the nature of clients; dynamic capabilities; and IT investments. In spite of the huge influences of the environment on CPSFs, QS practitioners seldom conduct environmental analysis. In this regard, the IT for strategy framework in figure 1 critically examines key issues in which contemporary businesses are operating, including QS practices. The factors of environmental turbulence within the ambit of the IT for strategy in QS practices consist of globalization; increased competition; macroeconomic changes; market uncertainties and demanding clients. It is necessary for QS practices to critically analyse these turbulent environmental factors in their pursuit of formulating strategy for competitive advantage in a dynamic market, mostly influenced by unpredictable technological changes. Considering the technological dynamism occurring globally, IT remains the most effective tool for keeping business performance afloat. In this regard, IT for strategy formulation should consider IT factors likely to influence the delivery of core businesses to clients. Within the domain of the IT for strategy, key technological factors for consideration by QS practitioners include automation; business process reengineering; technology integration; sustainability of IT and provision of value-added services to clients using IT infrastructure. It is apparent that an effective coordination and integration into IT for strategy of QS practices will create competitive advantage.

CONCLUSIONS AND RECOMMENDATIONS

An increasing body of knowledge has demonstrated the importance of strategic management in construction PSF's in Ireland, specifically in QS practices. The importance of the construction industry to the Irish economy as a whole cannot be overstated, nor the role of service firms therein. PSF's by nature are highly knowledge intensive, thus the strategic use of IT as a source of competitive advantage requires careful consideration.

While there are many studies pertaining to the use of IT in construction firms, they largely concentrate on software utilization and tools such as BIM. And whereas the relationship between IT and dynamic capabilities has been firmly established in research it has seldom been the focus of construction strategy research.

The combination of dynamic capabilities and IT for strategy formulation in QS practices has a huge potential of addressing critical strategic issues regarding competing within a cyclical and often volatile environment. IT dynamic capabilities have potential to create a fusion between IT internal use, collaboration, and communication; and dynamic capabilities of absorption, adaptation, innovation capability and network capability of QS practices. Finally, the conceptual framework for IT for strategy contributes to both theory and practice by providing the foundation for further studies linking IT, QS professional services firms; and strategic management principles which hitherto this study have not been extensively. Within the context of QS practices, the framework serves as a guidelines for assembling the key components for IT for strategy formulation in various QS firms for competitive advantage.

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