

PERFORMANCE MEASUREMENT AND MANAGEMENT IN CONSTRUCTION: A CONCEPTUAL FRAMEWORK

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Abstract: The dynamic and competitive business environment has motivated and compelled construction firms to implement contemporary performance measurement and management (PMM) systems and frameworks to generate more comprehensive information on their performance. The aim of this research is to develop a conceptual framework to better measure and evaluate the performance of construction firms. The methodology of this research is based on a comprehensive literature review of PMM in general, and in construction. This research discusses performance measurement concepts, key PMM frameworks in general use and in construction, and also presents the salient components of the proposed conceptual framework. The research findings reveal the relevance of PMM to the construction industry and show seven generic perspectives that can cover all facets of construction firms' performance. The critical success factors and related key performance measures that reflect the circumstances of construction firms and the industry were also identified for the framework. This research contributes to the body of knowledge in the area of PMM by proposing a conceptual framework, and developing an understanding of the need for PMM in construction. This research is part of ongoing research study being undertaken in Saint Lucia on PMM in construction.

Key words: critical success factors, construction firm, conceptual framework, performance measurement and management, performance measures.

1. INTRODUCTION/BACKGROUND

Business organisations in both developed and developing countries are operating in a rapidly changing and highly competitive business environment which impacts on their strategies and performance measurement and measurement (PMM) systems/frameworks. Changing customer demands and advances in technologies are some of the most important environmental factors in recent years that have impacted on effectiveness of the PMM within business organisations (Yadav-Sushil and Sagar, 2015). These environmental factors have caused business organisations to constantly modify or revise their strategies and PMM systems/frameworks in order to reflect the changing circumstances (Munir and Baird, 2016; Pekkola et al., 2016). Over the past three decades, the evolution of the business environment has triggered a PM revolution (Neely, 1999), which has led to a change in three foci as follows: (1) a shift in focus from traditional PM systems/frameworks relying solely on financial measures to contemporary performance measurement and management (CPMM) systems/frameworks using both financial and non-financial measures to assessing business performance (Behery et al., 2014); (2) a shift in focus from merely measurement and control towards performance measurement and management for measuring and managing business performance (Yadav-Sushil and Sagar, 2013); and (3) a move from merely concentrating on the interest of shareholders to focusing on the interest all stakeholders (Yadav, Sushil and Sagar, 2013). Consequently, numerous CPMM systems/frameworks such as the Balanced

Scorecard (BSC) were developed and diffused over the years to evaluate organisations' performance (Baird, 2017; Micheli and Mura, 2017).

The PM revolution has moved to the construction industry but at an incremental pace (Deng and Smyth, 2014). In light of this, CPMM frameworks have been adapted and implemented by a number of construction organisations to drive performance improvement (Horta et al., 2012). Over the past few decades, there are many studies on PMM in construction (Yang et al., 2010) and most of these studies have focused on the evaluation of project-level performance (Ali et al., 2013; Jin et al., 2013). In recent years, however, studies on PMM in construction at organisational level has increased (Yu et al, 2007; Jin et al., 2013). A few previous studies have attempted to develop conceptual frameworks for the performance evaluation of construction organisations, and there have been few follow-up studies (Yu et al., 2007). Furthermore, there is a paucity of papers that attempt to critically review the extant literature on PMM in construction (Yang et al., 2010). In response to the above gaps in the literature, this research aims to provide a critical review of PMM literature to develop a conceptual framework that will better measure and evaluate the performance of construction firms with a view of improving their success.

2 LITERATURE REVIEW

2.1 Performance measurement and management in General

In the context of organisations, performance measurement refers to as “a systematic process for obtaining valid information about the performance of an organisation and the factors that affect performance” (Yaghoobi and Haddadi, 2016, p.960), whereas performance management involves the use of the information generated through performance measurement (PM) to manage performance (Saunila, 2016). Organisational PM can be classified as traditional PM and contemporary performance measurement and management (CPMM). The traditional PM focuses solely on financial performance measures (Yaghoobi and Haddadi, 2016) such as profit, cash flow and return on investment. Many researchers and practitioners have criticised the exclusive use of financial performance measures because of their shortcomings. Financial performance measures are no longer adequate to evaluate organisations' performance in today's rapid changing business environment (Munir and Baird, 2016). They are lagging indicators, in that they provide information on the results of management actions already taken (Ali et al., 2013). To overcome these criticisms, a proliferation of CPMM systems/frameworks were subsequently developed that comprise both non-financial and financial performance measures, representing different perspectives to evaluate organisations' performance (Silvi et al., 2015; Baird, 2017). Some other salient attributes of a CPMM systems/frameworks include inter alia: they contain both internal and external performance perspectives, measure short-term and long-term performance, comprise forward and backward- looking measures, are characterized by causal relationships among the different measures and perspectives (Silvi et al., 2015); and link performance measures with strategy and/or value drivers (Baird, 2017).

CPMM systems have been adopted as a practice in many different organisations of all sizes (Akhtar and Mittal, 2015), and have also been practiced in mostly all sectors and industries around the world (Bititci et al., 2012; Deng and Smyth, 2014). They can balance organisational strategic, tactical and operational perspectives; improve organisational performance and competitiveness (Parida et al., 2015); support decision making (Taticchi et al., 2012; Silvi et al., 2015) and ultimately lead to organisational effectiveness (Upadhaya et

al., 2014). CPMM systems play an integral part in all the fundamental components of management practice including strategic management (Jin et al., 2013), for example by facilitating the execution of strategy (Niven, 2014; Micheli and Mura, 2017); performance management (Bititci et al., 2012), for instance by influencing people's behaviour (Yuliansyah et al., 2017); and risk management for example by identifying and managing key risk factors in an organisation (Moullin, 2017).

2.2 CPMM frameworks

The literature identifies various key CPMM frameworks that can be adopted by business organisations (Baird, 2017). The life cycle stages of a new PMM system/framework entails design, implementation, and use and review (Gutierrez et al., 2015). Some well-known CPMM frameworks include but are not limited to the Balanced scorecard (Kaplan and Norton, 1992), Results and Determinants Framework (Fitzgerald et al 1991), Performance Pyramid (Lynch and Cross, 1991), Performance Prism (Neely et al., 2001); EFQM business excellence model (EFQM, 2017). Folan and Browne (2005) differentiate between structural and procedural frameworks. The BSC, which is a structural framework, is now discussed below.

The BSC has evolved over time (Sigalas 2015), and is the most widely used, universally accepted PMM framework (Lueg, 2015). Typically, it contains performance measures from four distinct perspectives, namely, financial, customer, internal business process, and learning and growth to evaluate an entity's performance (Sigalas, 2015; Baird, 2017). The BSC can help organisations to link and align financial and non-financial performance measures with their strategy (Behery et al., 2014), and thereby monitor their performance in line with their strategy and vision (Mehralian et al., 2017). Business organisations can use the BSC to translate their strategic objectives into a coherent set of performance measures and targets (Moullin, 2017). It enables organisations to link together their performance measures across the different perspectives through strategy maps, which reflect the cause-and-effect relationships with the view of meeting their strategic goals (Francioli and Cinquini, 2014; Perkins et al., 2014). It can also be deployed for organisational decision making (Hoque, 2014), and for management and organisational change (Pimentel and Major, 2014). Lueg (2015, p.35) suggests that the BSC provides organisations a comprehensive view of their business model, and helps managers focus on what really matters to the organisations' business model by using a set of suitable measures.

Despite its popularity and usefulness, the BSC, however, has some limitations that should be noted if it is to be effectively implemented within organisations. The BSC is claimed to be mainly a top-down performance management approach (Nørreklit et al., 2012), which limits the contribution and involvement of employee in strategy. Some authors (Nørreklit et al., 2012; Francioli and Cinquini, 2014) argue that the cause-effect relationship between and within BSC perspectives is overly simplistic, ambiguous, dangerous and are not well understood, and consequently will mislead management. Also, the four perspectives of the BSC could ignore some critical stakeholders and aspects of the organisation and its value chain (Barnabè, 2011), and are based on impressions rather than reasoning (Nørreklit et al., 2012).

2.3 Performance measurement and management (PMM) in construction

Overview of PMM in construction

PMM in the context of construction is typically centred at three different levels, namely: project, organisation and industry levels (Elyamany et al., 2007; Chan, 2009; Deng et al., 2012). Previous studies on PMM in construction have focused on evaluating project performance (Lin and Shen, 2007; Ali et al., 2012). In the last few decades, however, PMM in construction at the organisation level has received growing attention in the literature (Ali et al., 2012; Jin et al., 2013). More specifically, there has been a plethora of studies conducted in construction (e.g. El-Mashaleh et al., 2007; Yu et al., 2007; Bassioni et al., 2008; Luu et al., 2008; Jin et al., 2013; and among others) that examine the importance of PMM, and the application of CPMM frameworks to construction organisations in order to measure, evaluate and manage their performance.

The need for PMM in construction

There is growing recognition of the need for CPMM systems/frameworks within construction organisations to provide information to meet their strategies and objectives. They can deploy CPMM frameworks to achieve continuous improvement (Meng and Minogue, 2011; Halman and Voordijk, 2012), including project management improvement (Haponava and Al-Jibouri, 2012) and improvement in their competitiveness (Oyewobi et al., 2015). According to Yu et al. (2007), construction organisations can adopt CPMM systems for evaluating management performance, managing human resources, and formulating corporate strategy (p.131). Effective CPMM frameworks enable construction firms develop strategies to improve their competitiveness, support their decision making process, to perform benchmarking (Ali et al., 2013; Ercan and Koksal, 2016); to achieve profitability and sustainable growth (Horta et al., 2013); and to capture the interests of all their key stakeholders (Cheng et al., 2014). Furthermore, CPMM frameworks can improve the budgeting process for construction projects and organisations (de Azevedo et al., 2013), and can support and improve collaborative design in construction (Ren et al., 2013).

PMM frameworks in construction

The three main CPMM frameworks that have been proposed, adapted and applied in construction to measure project, organisational and industrial performance are the balanced scorecard (BSC) model, key performance indicators (KPIs) model, and European Foundation for Quality Management (EFQM) excellence model (Yang et al., 2010; Meng and Minogue, 2011; Oyewobi et al., 2015). In addition to EFQM model, the Malcolm Baldrige National Quality Award (MBNQA) is another business excellence model, which is based on the seven criteria (i.e. leadership, strategy, customers, measurement, analysis, and knowledge management; workforce; operations; and results), that has been widely applied in construction in the USA and many other countries to evaluate performance (Oyewobi et al., 2015; NIST, 2017).

Yu et al. (2007) propose the adoption of the original BSC to evaluate the performance of construction companies and Chan (2009) considers and applies the original BSC to evaluate the performance of the construction industry. Jin et al. (2013) and Halman and Voordijk (2012) propose the use of a modified BSC for performance evaluation of organisations.

Following the Egan's (1998) Rethinking Construction Report, Constructing Excellence plays a central role in the UK construction industry PMM by continually developing and annually publishing the main sets of industry Key Performance Indicators (KPIs) covering the three aspects of sustainability – economic, social and environment performance of firms and projects (Constructing Excellence, 2016). Examples of economic KPIs include client satisfaction, contractor satisfaction, and productivity; social (people) KPIs include staff turnover rate, sickness absence, and training; and environment KPIs include energy use, mains water use, and waste (Constructing Excellence, 2016). The KPIs allow firms to measure and benchmark their performance as well as their project performance (Constructing Excellence, 2009; Haponava and Al-Jibouri, 2012).

Meanwhile, the EFQM Excellence Model can be used for “enabling an organisation to gain a holistic overview of their current level of excellence and prioritise their improvement efforts to maximise their impact” (EFQM, 2017, p.7). This Model uses nine criteria of performance. Five of these criteria are ‘enablers’ which measure what an organisation does and how it does it, and four criteria are ‘results’ measuring what an organisation achieves (EFQM, 2017). Leadership, people, strategy, partnerships and resources, and processes, products and services are the five ‘enablers’ criteria; while people results, customers results, society results and business results are four ‘results’ criteria of the Model (EFQM, 2017). An EFQM based model was proposed by Mohamed and Chinda (2011), and Shanmugapriya and Subramanian (2016) to evaluate the safety practices and safety performance improvement in construction organisations.

3 RESEARCH METHODOLOGY

The aim of this research, which is part of a larger research, is to develop a conceptual framework for evaluating the performance of construction firms. A comprehensive literature review was conducted to investigate PMM in general and in construction to inform the development of the conceptual framework. This research articulates and discusses the key components of the framework including the perspectives, critical success factors and performance measures that are applicable to construction organisations. Construction firms were selection in this research because they play a pivotal role in the national and global economy. Bassioni et al. (2004) refer to construction firms as “firms that undertake construction of civil or building facilities and can include a design function” (p.42). In this research, construction firms are entities that undertake the construction of civil and/or building works, and construction related services. The literature review provides information on well-established CPMM frameworks such as the BSC that are used to measure and evaluate the performance of organisations, in particular construction organisations. The proposed conceptual framework is based on BSC because it is found to improve organisational performance and climate (Molina et al., 2016) and it is the most widely used and diffused PMM framework (Lueg, 2015), which is now discussed below.

4 DEVELOPMENT A CONCEPTUAL FRAMEWORK

The proposed conceptual framework in this research is shown in figure 1. CPMM frameworks such as the BSC should help organisations capture the interests of their key stakeholders. Accordingly, the proposed conceptual framework considers the needs of shareholders as well as other relevant stakeholders in the construction industry such as

customers, suppliers, and the environment/community which were often ignored in most previous PMM frameworks (Chan, 2009). Its development involves providing a definition of conceptual framework, formulation of strategy and description of its components, which are now discussed below.

4.1 Definition of conceptual framework

Shanmugapriya and Subramanian (2016) define a conceptual framework “a process comprising of concepts and causal relationship between these concepts”. A conceptual framework intends to achieve desired goals for an organisation. In this study, the proposed PMM conceptual framework encapsulates the key components of PMM, and attempts to demonstrate the interaction between them to produce the desired results or outcomes for a business entity.

4.2 Strategy-driven

Construction organisations should ensure that every key component of their PMM framework should be derived or translated from their strategy (Niven, 2014). This view is supported by many authors (e.g. Soderberg et al., 2011). They need first to formulate their strategy and then establish the linkage between strategy formulation processes and PMM framework as articulated by some authors (Gimbert et al., 2010; Micheli and Mura, 2017). Gimbert et al. (2010, p.479) define strategy formulation as “the process through which a firm defines its overall long-term direction and scope” to create value. In a study on PM of construction firms, Lu et al. (2008) found that performance measures were derived directly from corporate strategy formulation using a strategic map.

4.3 Identification of the key components of the conceptual framework

The proposed conceptual framework comprises the following potential key components: BSC perspectives, critical success factors (performance criteria), and corresponding performance measures that are relevant the construction industry, which is exhibited in Table 1 below.

Table 1: The potential key components of the proposed conceptual framework

#	Perspective	Critical success factors	Performance measures
1	Financial	Profitability, growth and stability (Yu et al., 2007).	Return on investment, profit margin (Liu et al., 2015); revenue growth rate (Yu et al., 2007; Ali et al., 2013).
2	Customer	Client or customer satisfaction (Jin et al., 2013; Cheng et al., 2014); market share (Yu et al., 2007).	Customer satisfaction ratings, percentage of Repeat Customers, relative market share (Ali et al., 2013).
3	Internal business processes	Research and development, technological capability, business efficiency (Yu et al., 2007); risk management (Bassioni et al., 2008).	Defeat rate, successful tenders’ rate, accident rate, percentage of expenses to sales (Ali et al., 2013).

4	Learning and growth	Organisational competency (Yu et al., 2007); employee development, and technology competency (Luu et al., 2008).	Employee productivity (Yu et al., 2007); Employee satisfaction survey (Jin et al., 2013); investment in IT for construction (Luu et al., 2008).
5	Supplier	Supplier management (Bassioni et al., 2008).	Materials return rate, supplier on-time delivery, quality of purchased goods (Halman and Voordijk, 2012).
6	Project	Project management (Cserháti and Szabó, 2014).	Safety, cost, time, quality, client's satisfaction (Yeung et al., 2013).
7	Environment & community	Sustainability (Jin et al., 2013).	Energy and water consumption; waste and scrap level, contribution to the community (Parmenter, 2015).

The following sub-sections describe the key components of the proposed conceptual framework.

Step 1: identification of perspectives

It is imperative for construction organisations to identify their performance perspectives that represent a comprehensive coverage of all pertinent aspects of their business model. Some authors have proposed the use of the original perspectives of BSC to evaluate the performance of construction organisations (Yu et al., 2007). However, Lueg (2015) suggests that the original BSC ignores developments in the industry-specific, social and natural environments (p.37). Accordingly, some other authors have added relevant perspectives to the original perspectives of the BSC to evaluate the performance of construction organisations (Jin et al., 2013; Ali et al., 2013) or have replace existing perspectives of original BSC with new ones (Ozorhon et al., 2011). The conceptual framework proposed in this research includes three additional performance perspectives to the four original perspectives of the BSC namely project perspective (Kagioglou et al. 2001); supplier perspective (Kagioglou et al. 2001); and environment & community perspective (Parmenter, 2015; Björklund and Forslund, 2013) to reflect the distinct characteristics of the construction industry. The proposed conceptual framework therefore attempts to include the triple bottom line aspects of sustainability, namely economic, social and environmental performance (Yadav-Sushil and Sagar, 2013). The seven potential interrelated performance perspectives are now briefly discussed.

(1) Financial perspective: The financial perspective focuses on providing more value to the shareholders of construction organisations in terms of improvements in the bottom line results (Chan, 2009). Construction organisations can use this perspective to demonstrate their financial accountability and stewardship through the production and validation of financial statements.

(2) Customer perspective: PMM in construction is usually client-driven. Therefore the customer perspective is critical for construction organisations to assess their customers' requirements (Oyewobi et al., 2015) and hence increase customer value, which can lead to close customer relationships and high-quality in their operations (Jin et al., 2013).

(3) Internal business processes: This perspective requires construction organisations to place emphasis on integrating and improving the internal efficiency of their business processes to achieve excellence (Ali et al., 2013; Jin et al., 2013).

(4) Learning and Growth: This perspective requires construction organisations to invest in their human resources development, their competency, and informatization (Yu et al., 2007), in order to manage their business and improve their performance and ability to adapt to change (Perkins et al., 2014).

(5) Project perspective: The construction industry is mainly project based (Ozorhon et al., 2011; Keung and Shen, 2013). Therefore, this perspective requires construction organisations to drive focus on evaluating the successfully achievement of project performance. Project performance is the realization of predefined project objectives (Ozorhon et al., 2011) and hence project success.

(6) Supplier perspective: The supplier perspective requires construction organisations to evaluate and monitor suppliers' performance in term of service quality and speed of service delivery, flexibility, and the relationships and partnerships with them.

(7) Environment & Community perspective: The importance of environmental and community perspective and its corresponding measures within CPMM frameworks is growing (Björklund and Forslund, 2013) in order to manage the environmental impact on organisational activities. These authors further suggest that an improvement in community/environmental performance will increase the focus on customers and suppliers, and it is an important source of competitive advantage for organisations.

Step 2: identification of CSFs and performance measures

Some construction researchers (Kulatunga et al., 2011; Cheng et al., 2014) have underscored the importance of identifying organisational critical success factors (CSFs) that are aligned with each perspective within the CPMM framework. CSFs are a number of important factors on which organisations should direct and concentrate their limited resources in order to achieve success (Yong and Mustafa, 2013). Construction organisations also need to identify an appropriate set of performance measures and associated targets for each of the identified CSFs (Toor and Ogunlana, 2010; Parmenter, 2015) to monitor the achievement of their mission, strategy, goals and objectives. The proposed conceptual framework uses both financial and non-financial measures of performance to reflect the holistic coverage of an organisation's business model.

Step 3: definition of a framework review procedure

A PMM framework should also include a procedure for review or assessment (Taticchi et al., 2012). The review process should be conducted to ensure that its relevance to organisational strategy and the business environment, for continuous improvement and for questioning strategic assumptions and actions, and hence could improve its effectiveness (Gutierrez et al., 2015). Moreover, the results of the review process can be used to refine the key components of, or the entire PMM framework (Gutierrez et al., 2015) to meet key stakeholders' expectations.

Step 4: diagrammatical representation of the conceptual framework

Figure 1 exhibits the initial conceptual PMM framework for evaluating the performance of construction firms. This initial proposed conceptual framework, called the Holistic Business Scorecard (HBS), focuses on specifying the key components required for evaluating the performance of construction organisations, which are also link to strategy formulation. It includes a component to perform review procedures that will ensure its relevance to strategy and the changing business environment as suggested by Gutierrez et al. (2015). It is important to note that the presented conceptual BSC framework is developed only from the literature. Primary data are currently being collected from a questionnaire survey amongst industry practitioners, and detailed case studies including semi-structured interviews with practitioners within case study firms in Saint Lucia to empirically test and further develop the conceptual framework. Furthermore, the proposed BSC conceptual framework will be validated with some semi-structured interviews with practitioners in the construction industry. Consequently, the conceptual framework will undergo revisions or refinements after gathering and analysing the data from the empirical investigation stage of the research. The conceptual BSC framework will provide a structured way for construction firms to better measure and evaluate their performance, and assess the contribution of key stakeholders. Consistent with prior studies (Ali et al., 2013; Ercan and Koksall, 2016), the conceptual framework can facilitate benchmarking of performance within each construction organisation, and among the organisations in the construction industry. Furthermore, it has the potential to be tailored to different organisational needs and contexts.

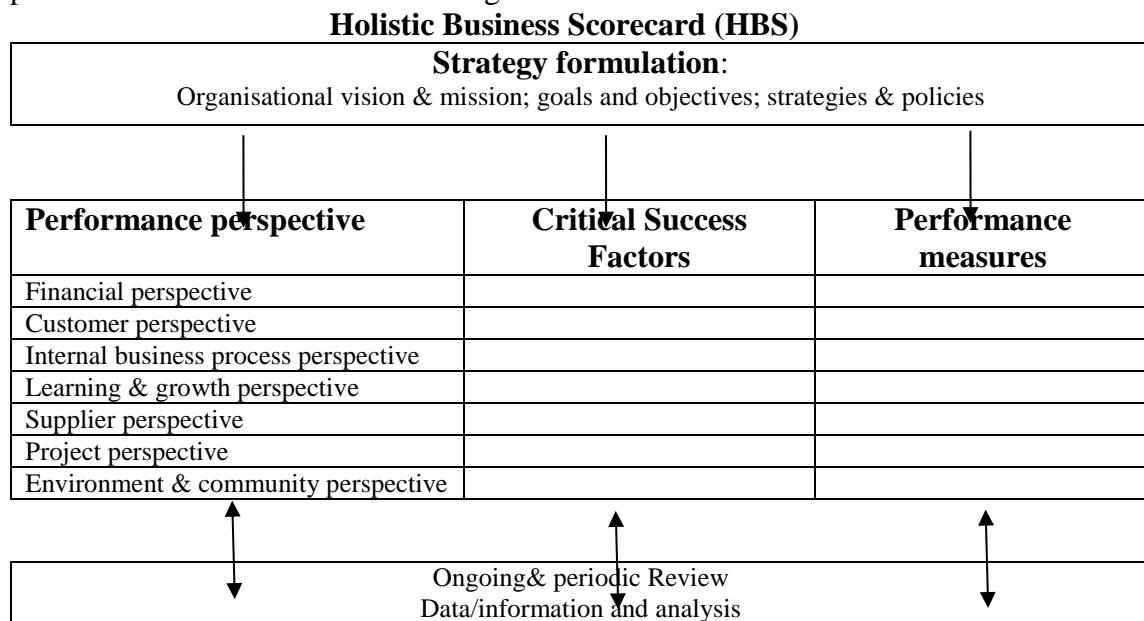


Figure 1: Proposed conception framework

5. CONCLUSION

This research comprehensively reviews the current literature on performance measurement and management (PMM) in general and in construction. In particular, this research presents an understanding of the need for PMM in construction, and concludes that the major PMM frameworks adopted in construction for evaluating performance include BSC, KPI, EFQM excellence model, and MBNQA. By using the BSC, in particular, construction firms can achieve performance improvement, determine and successfully execute their strategies, and

compare their performance to others in the industry by using benchmarking. In this research, a PMM framework based on the theoretical underpinnings of the BSC has been conceptualized for construction firms to better measure and evaluate their performance. Using the literature review, seven perspectives with associated critical success factors and performance measures that are applicable to the construction industry are identified for the proposed conceptual framework. In particular, the identified core components of the proposed BSC framework are capable of capturing the performance of the key business areas of construction firms. Ongoing research is currently being undertaken in the construction industry in Saint Lucia to empirically test the proposed BSC conceptual framework using questionnaire surveys and case studies, and then validate it with some semi-structured interviews. Finally, the findings from this research provide preliminary insight on the development and synthesis process of the conceptual BSC framework for the performance evaluation of construction firms.

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