THEORETICAL FORMULATION OF A FRAMEWORK FOR MEASURING BUSINESS PERFORMANCE IN CONSTRUCTION

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ABSTRACT: Business performance measurement, across industries, has significantly changed over the past two decades, integrating non-financial with financial measures. Moreover, the Egan and Latham reports have advocated performance improvement in the construction industry, with performance measurement being a key element. The purpose of this paper is to theoretically formulate a framework for measuring business performance in construction. The framework builds upon the well-established principles of the Balanced Scorecard and Business Excellence models. Formulation is based on integrating the criteria / perspectives of the founding frameworks into performance factors, and integrating the underlying logic. The formulation process is evaluated by comparing the proposed framework against the Balanced Scorecard, Excellence models, Total Quality Management frameworks in literature, and to the Performance Prism. The proposed framework is further adapted for construction companies and is shown to include the Construction Best Practice Programme - Key Performance Indicators that are based on Egan's industry report.

KEYWORDS: Balanced Scorecard, Performance Measurement, Excellence Models, Key Performance Indicators, Performance Prism.

1. INTRODUCTION

In a time of globalisation and an increasingly competitive environment, measuring and improving performance has become critical to business success. The inadequacy of traditional financially based performance measurement frameworks and the introduction of non-financial measures have triggered a considerable amount of research and attention over the past fifteen years, to the extent that it has been described as a revolution (Neely, 1999). Research on the topic has stemmed from management theory, organisational behaviour, and manufacturing management literature (Amaratunga and Baldry, 2002). Meanwhile, many performance measurement frameworks have been developed that view business performance from different perspectives. The existence of these many performance frameworks have lead companies to either choose a single framework, and thus missing on important performance aspects measured by other frameworks, or using more than one framework at the same time which can utilise valuable resources or lead to measuring overlapping areas in different ways, thus confusing or misleading decision makers. A need has been expressed to develop a comprehensive framework to overcome the difficulties of dealing with more than one framework. This need has been previously identified in literature and expressed in the attempts to develop comprehensive frameworks or best practice models (Bassioni, Price and Hassan, 2004; and Neely and Adams, 2001).

The purpose of this paper is, therefore, to theoretically formulate such a comprehensive framework for measuring organizational business performance. The formulation is conducted through the integration of well-established existing frameworks (founding frameworks). Selection of the founding frameworks for the integration process is based on their establishment among researchers and practitioners to provide evidence of conceptual acceptance and applicability. The selected founding frameworks include the Balanced Scorecard (Kaplan and Norton, 1996) and the business excellence models of the European

Foundation for Quality Management (EFQM) (British Quality Foundation, 2002) and the Malcolm Baldrige Quality Award (MBNQA) (Baldrige National Quality Program, 2002).

Research in business performance measurement in construction, as most research in construction management, has been focused on the project rather than the organisation. In addition, a few attempts were made to develop organisational performance measurement framework adopted to construction, and were mostly extensions of established frameworks, as in the modified Balanced Scorecard developed in Kagioglou, Cooper and Aouad (2001) and Amaratunga and Baldry (2003). Furthermore, rare cases of developing comprehensive organisational frameworks in construction have been cited as in Mbugua (2000) and Samson and Lema (2002), but failed to show clear relationships among performance factors. Thus, the formulation of this framework also aims to build on the relationships embedded in the performance factors (criteria / perspectives) of the founding frameworks to develop logical underlying relations that can provide managers with an understanding of the consequences of performance factors on others, and thus assist in decision making.

2. FORMULATION METHODOLOGY

2.1 Basing the Framework on Well-Established Frameworks

For the formulation of the framework, and to avoid reinventing the wheel, the successes and achievements of previous frameworks have to be considered. The formulation methodology could be based on producing a totally new framework, if the existing frameworks were significantly flawed or invalid. This would only add to the existing confusion among frameworks. However, reviews of contemporary frameworks in Bassioni, Price and Hassan (2004) show they are mostly valid and correct, but differ in measuring various facets of performance. Thus, it is only logical to combine and build upon the principles of existing frameworks, than to develop a totally new framework.

The scope of the framework would benefit from including as many of the available frameworks as possible. However, working with many frameworks can cause difficulties to the formulation process and make it intractable. Additionally, the validity of the founding frameworks (i.e. the frameworks used to build the framework) can significantly affect the validity of the resulting framework. Therefore, to make the formulation process feasible and meaningful, it should be based on a limited number of the most valid frameworks. Consequently, formulation is based on well-established frameworks to provide high confidence in their validity.

2.2 Selection of Founding Frameworks

Selection of the founding frameworks for the formulation process is based on their establishment and popularity among researchers and practitioners to provide evidence of conceptual acceptance and applicability. Based on a literature review in Bassioni, Price and Hassan (2004) and Kennerley and Neely (2002), the popularity of the Balanced Scorecard and the EFQM excellence model, in construction and across industries, can be notably identified. In addition, the MBNQA excellence model has wide use in the USA and many areas of the world, and is therefore included as a founding framework. Other frameworks, however, have not acclaimed such a wide popularity and therefore were not included.

Although the construction KPI (CBPP-KPI, 2003) are popular in UK construction firms, they were not included within the founding frameworks for their lack of a holistic approach

and their constitution of indicators rather than performance factors. Nevertheless, the developed framework was compared to the KPI to ensure their inclusion.

The Performance Prism (Neely and Adams, 2001) is a recent framework that has not yet reached the same popularity of the three founding frameworks, but was considered as a fourth founding framework. This is because of the development of the Performance Prism as a comprehensive framework (same as the aim of this research) and for its original perspective of performance measurement. Nevertheless, it was found that the integration of the first three founding frameworks resulted in a framework that has parallel logic to the Performance Prism, yet in more detail. Therefore, the performance prism was used to evaluate comprehensiveness of the framework, and not used as a founding framework in the formulation process.

2.3 Formulation Process

The formulation process of the framework involves four basic steps, as illustrated in Figure1: identification of performance factors; identification of underlying relationships; adaptation to construction; and evaluation of comprehensiveness. The first step integrates the performance factors of the founding frameworks into one set of factors. The second step identifies the underlying relationships between the performance factors. The importance of this second step is that it shows how performance factors interact and produce performance results, thus assisting management in isolating performance problems, understanding their effects and consequently taking appropriate actions.

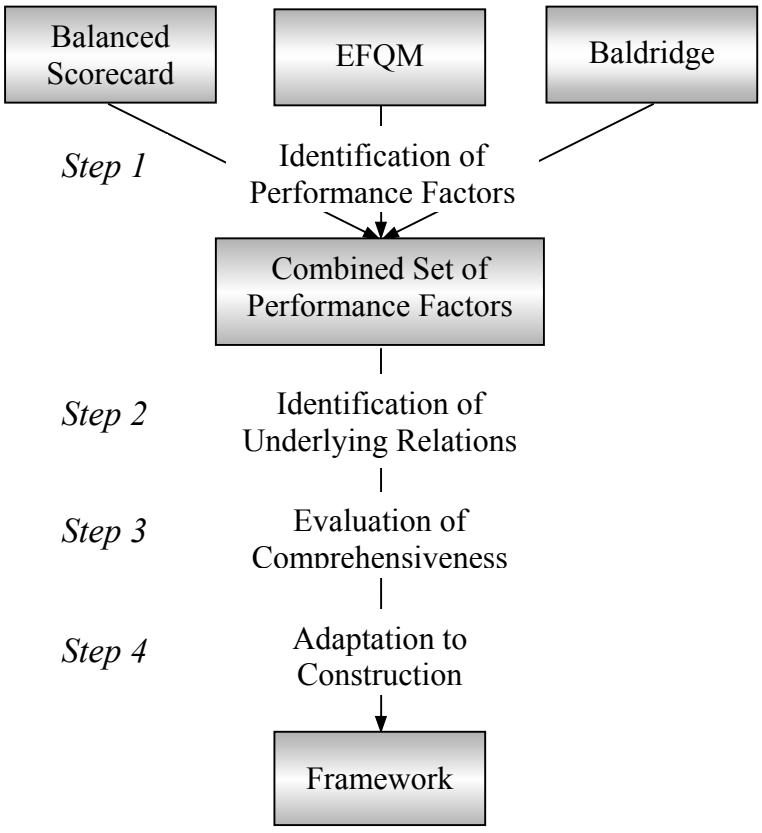

Figure 1. The formulation process of the framework

The third step of formulation is to evaluate the comprehensiveness of the resulting performance factors. This is achieved by comparing the framework to a leading comprehensive performance measurement framework, the performance prism (Neely and Adams, 2001), and the comparison revealed that the framework covers the Performance Prism performance factors as well as including two additional performance factors and that it has more detailed underlying relationships. In addition, comprehensiveness was evaluated by comparing to TQM frameworks of Saraph et al. (1989), Flynn et al. (1994), Ahire et al. (1996), and Black and Porter (1996) which showed the framework to constitute relevant business performance factors.

Managerial initiatives that mainly originate within manufacturing are not necessarily appropriate for construction, because of the inherent differences between construction and other industries (Ahmed and Sein, 1997; and Stockdale, 1997). Thus, it was necessary to adapt the framework to construction in the fourth and final step of formulation. Adaptation was based on previous applications and adjustments of the founding frameworks when applied to construction, in addition to literature on the subject. Furthermore, the framework was compared to the construction KPI and the comparison revealed their inclusion within the framework.

Another important difference between both models is the presence of customer, employee and public focus in MBNQA, although only identified as sub-performance factors. Russell (1999) stressed the importance of applying EFQM in a backward manner, starting with customer, employee and society results first, then implementing the enabling performance factors to yield the desired results. Russell in fact is promoting the use of customer, employee and society focus in EFQM. The framework performance factors included these points, while expanding 'people and society focus' to be 'people and other stakeholders focus', and separating the 'customer focus' as a separate performance factor to emphasize the importance of the customer among stakeholders. In the same manner, 'people results' and 'society results' performance factors of the framework have been merged into a single performance factor of 'people and other stakeholders focus', while 'customer results' has a separate performance factor. To have better organisation among the performance factors, and in line with the suggested improved EFQM model (Nabitz et al., 2001), the 'partnerships and resources' performance factor is split into 'partnerships and suppliers' and 'resource management.'

The resulting framework performance factors are further compared to the perspectives of the Balanced Scorecard, as illustrated in Table 1. The factors of column three are added to corresponding factors of the Balanced Scorecard in column four to form the combined set of performance factors in column five. Three of the Balanced Scorecard perspectives are analogous to previously defined performance factors, and the remaining 'innovation and learning' perspective is added to the performance factors. Moreover, the 'resource management' performance factor originally included knowledge and technology management from 'partnerships and resources' in EFQM. These sub-performance factors should preferably be part of the 'innovation and learning' performance factor, thus changing the performance factor name to 'innovation, learning and knowledge management.'

Table 1. The Integration of a Combined Set of Performance Factors

EFQM Criteria*	MBNQA Criteria*	Performance Factors Based on EFQM and MBNQA Criteria		Balanced Scorecard Perspectives	Framework Performance Factors
1. Leadership	1. Leadership	Leadership			Leadership
2. Policy and Strategy	2. Strategic Planning	Strategic Planning and Management			Strategic Planning and Management
3. People	5. Human Resources Focus	People Management			People Management
4. Partnerships and Resources		Partnerships and Resources	Partnerships and Suppliers		Partnerships and Suppliers
			Resources Management		Resources Management
5. Processes	6. Process Management	Processes Management		Internal Business	Processes Management
6. Customer Results	3.2 Customer Relationsips and Satisfaction. 7.1 Customer Focused Results	Customer Results		Customer	Customer Results
7. People Results	7.3 Human Resource Results	People Results	People and Other Stakeholder Results		People and Other Stakeholder Results
8. Society Results	7.4.b Public Responsibility and Citizenship Results	Society Results			
9. Key Performance Results	7.2 Financial and Market Results 7.4.a Operational Results	Business Results		Financial	Business Results
	3.1. Customer and Market Knowledge	Customer Focus			Customer Focus
	5.3.b Employee Support and Satisfaction 1.2.Public Responsibility and Citizenship	People and Other Stakeholder Focus			People and Other Stakeholder Focus
	4. Information and Analysis	Information and Analysis			Information and Analysis
				Innovation, & Learning	Innovation, Learning and Knowledge Management

*The numbering of EFQM and MBNQA success factors corresponds to their original numbering system.

4. IDENTIFICATION OF UNDERLYING RELATIONSHIPS

The underlying relationships of the framework are derived from those of the EFQM, MBNQA and the Balanced Scorecard and relevant literature and are shown in Figure 2. The performance factors are arranged to show a logical business flow of:

Leadership → Stakeholder focus →Strategic planning → Deployment → Results

The following points show the building of the underlying relationships

- Leadership has been well documented and acknowledged as the main driver of effective performance as in EFQM and MBNQA and other literature (Wilson and Collier, 2000; and Zairi, 1999), and is therefore placed at the forefront.
- Information and analysis, is dependent on leadership and affects all other performance factors as per Wilson and Collier's (2000) empirical validation of MBNQA. Furthermore, it provides feed forward and feed backward information between. Therefore, a double headed arrow is used to represent its relationship with other factors
- Customer, people and stakeholder focus has been stressed to precede strategy and deployment. Russell (1999) emphasized on the need to start with the desired results in implementing the EFQM model, thus advocating the focus on stakeholder needs prior to the enabling performance factors of the EFQM model. Additionally, it is only logical to have strategy and deployment dependant on customer, people and stakeholder focus, as a requirement for success.
- A study on the MBNQA relationships showed that strategic planning should precede other deployment performance factors (Wilson and Collier, 2000). Additionally, in management models, such as the Japanese Total Integrated Management (TIM) model, strategic planning / management (termed management cycle in TIM) is seen to proceed other deployment factors (Azhashemi and Ho, 1999).
- Further, all the performance factors of innovation, learning and knowledge management, people management, partnerships and suppliers management, and resource management are considered capabilities. The four capabilities performance factors are translated into operational processes that will finally yield the results required. This relationship is in line with the EFQM logic.
- The results are first expressed in customer, people and other stakeholder satisfaction, which finally yields business results. This notion is expressed in EFQM and Balanced Scorecard.

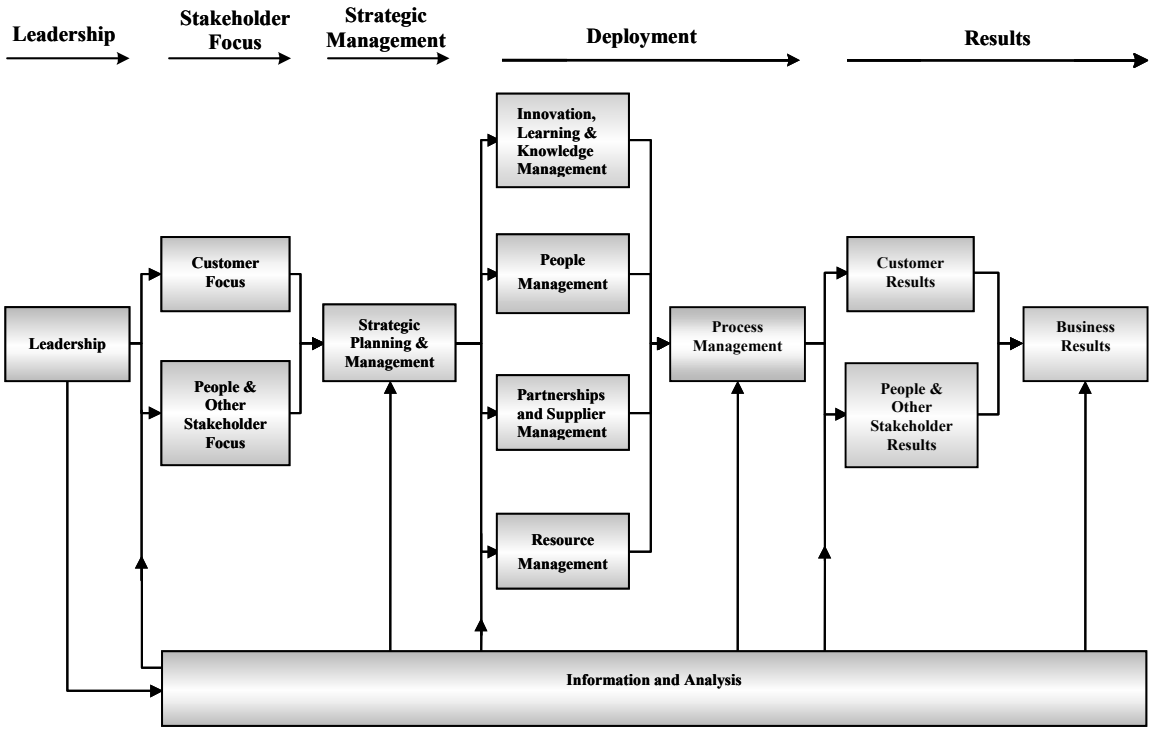

Figure 2. The Underlying Relationships of the Framework

5. COMPREHENSIVENESS EVALUATION

The Performance Prism was developed by Neely and Adams (2001) and focuses on stakeholders as the key to business success and measures their satisfaction as well as contribution to the organization. On a secondary basis, the strategies, processes and capabilities used to deliver stakeholder value are measured.

An assessment of the comprehensiveness of the framework in comparison to the Performance Prism is illustrated in Table 2 and shows the inclusion of Performance Prism performance factors in the framework and the existence of two additional performance factors in the framework: 'leadership' and 'information and analysis.' The framework has revealed more detailed relationships between these performance factors than that of the performance prism (Neely and Adams, 2001). It can be concluded that the framework covers the Performance Prism performance factors, contains two additional performance factors and has clearer underlying relationships.

To further show how the framework covers relevant business success performance factors in the framework, it is compared to TQM frameworks in literature of Saraph et al. (1989), Flynn et al. (1994), Ahire et al. (1996), and Black and Porter (1996). These models have been empirically tested and identify the areas of internal performance that require company attention, and that lead to a total quality organization and business results. The comparison is illustrated in Table 2 and shows that the framework is inclusive of the performance factors of each of the TQM frameworks.

6. ADAPTING THE FRAMEWORK TO CONSTRUCTION

The framework is based on general founding frameworks that are applicable across industries, and is therefore generic in its current form of Figure 2. To be applied in construction organisations, some adaptation might be required. The adaptation is based on how the founding frameworks were adapted, when applied to construction. Some specific modifications already exist in the framework. For example, Kagioglou, Cooper and Aouad (2001) added a 'supplier' perspective to the Balanced Scorecard of construction firms, Kanji and Wong (1998) emphasized the importance of partnering and supply chain management to construction projects and organizations, and McCabe, Seymour and Rooke (1996) highlighted the role of people management in quality-based excellence of construction companies.

The main adaptation of the framework is the addition of a 'project' performance factor. This performance factor was previously supplemented to the Balanced Scorecard in its application to construction (Kagioglou, Cooper and Aouad, 2001). The 'project' performance factor includes the typical construction project performance factors of time, cost and quality. Other project factors are necessary for project success, such as safety and project team harmony (Chan, Scott and Lam, 2002; and Sinthawanarong, 2000). Moreover, safety has been identified as an area for construction improvement in Egan (1998), and is added to the framework at the project level under the framework 'project' performance factors and at the organizational level under the framework 'people and knowledge results' performance factor. Furthermore project team harmony has been advocated by Ward et al. (1991) to be the major determinant of project success. Quality literature has additionally emphasized the importance of project teamwork in construction (Ahmed and Sein, 1996 and 1997; Shammas-Toma et al., 1998; and Sommerville and Robertson, 2000). Therefore project teamwork and harmony has been included in the framework 'project' performance factor.

Table 2. Comparing the Framework to the Performance Prism and Empirical Total Quality Management Frameworks

Suggested Framework	Performance Prism	Empirical TQM Frameworks			
		Saraph et al. (1989)	Flynn et al. (1994)	Ahire et al. (1996)	Black & Porter (1996)
1. Leadership		Top management leadership	Top management support	Top management commitment	Corporate quality culture
2. Customer focus	Stakeholder requirements		Customer involvement	Customer focus	Customer management
3. People and other stakeholder focus	Stakeholder requirements		Supplier involvement	Employee involvement	
4. Information and analysis		Quality reporting	Quality information	Internal quality information usage	-Quality improvement measurement system -Communication of improvement information
5. Strategic planning and management	Strategy				Strategic quality management
6. Innovation, learning and knowledge management	Capabilities				
7. People management	Capabilities and stakeholder contribution	Training		-Employee training -Employee empowerment	People management
8. Partnership and supplier management	Capabilities and stakeholder contribution	Supplier quality management		-Supplier quality management -Supplier performance	Supplier partnership
9. Resource management	Capabilities				
10. Processes Management	Processes	- Role of quality department -Product design -Process management	- Process management -Product design	-SPC usage -Benchmarking -Design quality management -Product quality	-Operational quality planning -External interface management
11. Customer results	Stakeholder satisfaction				Customer satisfaction orientation
12. People and other stakeholder results	Stakeholder satisfaction	Employee relations	Workforce management		
13. Business results	Stakeholder satisfaction				

The added ‘project’ performance factor needs to be fitted within the framework’s underlying relationships. The ‘project’ performance factor depends on the performance factor of ‘leadership’, ‘customer and stakeholder focus’ and ‘strategic planning and management’. Additionally, project success depends on the deployment of each of the capabilities and processes performance factors. In turn, project success causes customer and stakeholder satisfaction and finally reaps business results. The project performance factor is result oriented, and therefore it is fitted in the framework, as shown in Figure 3, and is named ‘projects results’. It is noted that each of the preceding performance factors are enablers for the ‘project results’ performance factor, and therefore each should be applied over the whole organization and cascaded over different projects.

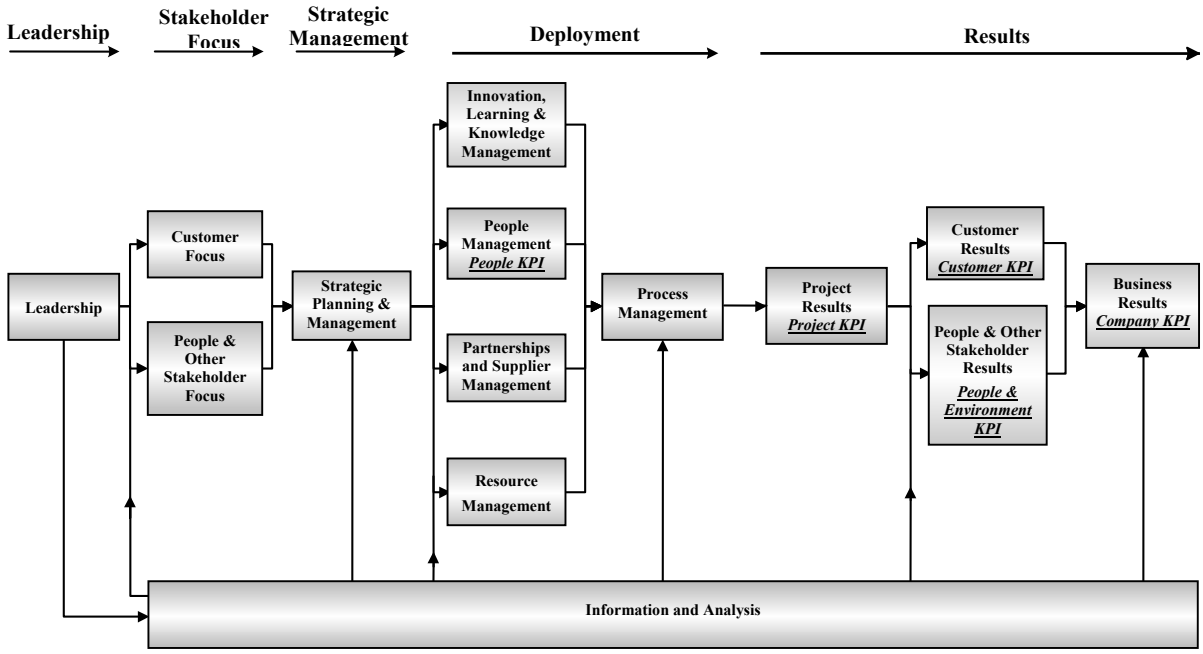

Figure 3. The Suggested Construction Framework Encapsulating the CBPP-KPI (2003)

The proposed framework has fixed performance factors and underlying relations, but companies have flexibility in defining company-specific indicators for each factor. The flexibility provided in this method of performance measurement suggests it to be a framework rather than a strict model. However, it is possible to develop standard indicators for each factor and consequently use the framework for benchmarking purposes. The indicators used specified by companies can include the construction KPI (CBBP-KPI, 2003), at the discretion of the company, as shown in Figure 3. For example, the KPI relating to projects such as cost and time predictability can be used in the 'project results' factor. Environment - KPI such as impact on biodiversity and impact on environment indicators as well as Respect for People – KPI that are result oriented such as employee satisfaction and turnover can be used in the 'people and other stakeholder results' factor. Respect for people – KPI that are driver oriented such as pay and training can be situated in the 'people management' factor. Furthermore client related KPI such as client satisfaction for products and services could be located in the 'customer results' factor and company related KPI such as profitability could be measured in the 'business results' factor.

7. CONCLUSION AND FURTHER WORK

A need exists to develop a comprehensive performance measurement framework in construction. This paper aims to theoretically formulate such a framework by integrating the well-established frameworks of the Balanced Scorecard, EFQM and the Baldrige models. The formulation process was achieved in four main steps. First the performance factors of the founding frameworks were integrated, then the underlying relationships among them consistent with the founding frameworks were devised. The framework was compared to the Performance Prism and to empirical TQM frameworks to assess comprehensiveness, revealing that the framework has sufficient coverage and more detailed underlying

relationships. Finally, the framework was adapted to be appropriate for construction and was shown to include the construction KPI based on Egan's "Rethinking Construction" report.

The wide coverage of performance factors provides managers with a more comprehensive view of organisational performance. In addition, the underlying relationships provide guidance as to the effect a performance factor has on others, thus equipping managers with better information to base decision-making. The framework intends to eliminate possible confusion and reduce the resources associated with designing, operating and maintaining more than one performance framework. The framework however, should be subjected to empirical evaluation and validation that is expected to revise and enhance the framework beyond the theoretical formulation, whereas this paper acts as a theoretical foundation for future empirical work.

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