

## Integrating sustainability into construction project management: Barriers in developing countries

Ali Fathalizadeh<sup>1</sup>, Parviz Ghoddousi<sup>2</sup>, Ali Akbar Shirzadi Javid<sup>3</sup>,  
M. Reza Hosseini<sup>4</sup>, Arka Ghosh<sup>5</sup>

<sup>1, 2, 3</sup>*School of Civil Engineering, Iran University of Science and Technology, Narmak, Tehran, Iran*

<sup>4, 5</sup>*School of Architecture and built environment, Deakin University, Geelong, VIC, Australia*

*E-mail: <sup>5</sup>ghoshar@deakin.edu.au (corresponding author)*

**Abstract.** This paper is an attempt to explore the barriers to integrating sustainability into construction project management in developing countries. To this end, a comprehensive review of the literature is conducted, as a result of which a list of 30 barriers is culled from existing studies. The list of barriers is subsequently assessed in terms of relative importance index (RII) through a survey questionnaire administered to Iranian construction industry experts, resulting in a dataset of 176 completed questionnaires. Findings bring to light the most influential barriers to incorporating sustainability in construction projects for a developing country. These were: (1) lack of understanding of the potential self-benefits of proactivity and high economic risks that unsustainable practices may carry, (2) inadequate assessment of risks and a silo-based approach, namely, insufficient cooperation among practitioners, research institutions and environmental organisations and (3) the lack of a systematic approach to planning and acting for the fulfilment of sustainability goals. As one of the first studies in its kind, the paper offers invaluable insight for researchers, practitioners, and policy makers, in supporting the transition of construction project management practices towards fulfilling sustainable development goals.

**Keywords:** sustainable development, integration, construction projects, green building, challenges.

### Introduction

There is an enormous demand for delivering construction projects in developing countries, as a result of their agenda for providing much needed infrastructure for advancing their economies. These effort, however, come at the expense of the environment (Banihashemi, Hosseini, Golizadeh, & Sankaran, 2017; Hosseini et al., 2017). In order to achieve long-term economic gains along with preserving the built environment, there is an immediate need to move through sustainability in every field of business, including construction project management (Chawla, Chanda, & Angra, 2018).

Integrating sustainability into various disciplines and practices has received considerable attention in recent years. A review of the literature, however, shows that very few studies have targeted construction project management. This presents a major problem, given that as announced By (International Energy Agency, 2018) in 2018, the construction industry is responsible for about 41% of total energy consumption globally, and close to 40% of total CO<sub>2</sub> emissions. Despite these facts, integration of sustainability into construction project management practices has been very slow, with outcomes being far from satisfactory (Marcelino-Sádaba, González-Jaen, & Pérez-Ezcurdia, 2015). This reflects the impacts of barriers, as a result of which, attempts towards making construction project management practices sustainable have been thwarted.

This study is the first attempt towards identifying these barriers. Findings will be invaluable for researchers through providing an illuminating insight into the nature of barriers, creating a stepping stone for future research on the topic. For practitioners, the list of barriers and the relative importance of each one assist practitioners and policy makers in allocating much needed resources to addressing the most influential barriers, hence enhancing their efficiency in overcoming barriers and challenges and identifying the areas in need of particular attention for making their practices sustainable.

## **Background and literature review**

There is consensus in the literature on the cardinal importance of considering sustainability in construction project management (Silvius, 2017; Sfakianaki, 2019). What follows next provides a background to the main themes and concepts associated with integrating sustainability into construction project management practices.

### *Sustainability and the construction industry*

Sustainability is one of the most important challenges of contemporary businesses (Silvius, 2017), and the need for sustainable development has been widely documented (Redclift, 2005). In this regard, the scholarly literature demonstrates that the construction industry has a significant impact on the environment, as well as, on social and economic life, and it has become a growing concern (Sfakianaki, 2019). The revelation of data on to the impact of construction on the environment has attracted particular attention from politicians, administrative authorities, policy makers, construction professionals, the scientific community and consumers, worldwide (Kylili & Fokaidis, 2017; Sfakianaki, 2019). Sustainability concerns in delivering construction projects have been high on the agenda in advanced economies. Yet, developing countries have put economic development above meeting sustainability requirements. The need for economic growth in developing countries has fueled a huge demand for construction projects, hence environmental concerns being overshadowed (Banihashemi et al., 2017). Applying sustainability practices on construction project management has a wide range of dimensions based on various approaches, from the extraction of raw materials through the planning, design and construction of buildings and infrastructure, and their final deconstruction and management of the waste (Sfakianaki, 2019), a description of which follows.

### *Integrating sustainability into construction project management*

Sustainability has been integrated into construction project management through various approaches in academic papers. Banihashemi et al. (2017) defines integrating sustainability into project management by providing a framework which encapsulates the identified success factors for delivery of construction projects. With the balanced requirement of environmental, economic and social aims in projects strengthening, the need for integrating sustainability into project management has drawn attention in both academia and practice. Especially for mega construction projects, how to accomplish sustainability-related objectives in project practices has been endowed with an invaluable importance (Yu, Zhu, Yang, Wang, & Sun, 2018). Sánchez (2015) addresses this need to integrate sustainability into project management by evaluating the projects in case of their profits and economic, environmental and social impacts. Despite their broad potential and strong promotion within academic discourse, sustainable construction project management practices have not been widely adopted across the construction industry, mainly due to a plethora of barriers (Sánchez, 2015). These barriers in the construction context represent a real problem. According to Müller-Bloch and Kranz (2015), the term research problem – and the ensuing call for action/resolution – can also be applied interchangeably with the term research gap. This research problem – gap – acts as an input for conducting new studies. For the present study, it triggers further research with the aim of identification of such barriers, as discussed next.

### *Barriers*

There are no studies in the field with specific attention to barriers to integration of sustainability into construction project management. Studies with the closest similarity with this aim are those that have addressed the topic from the perspective of critical success factors (CSF), affecting the integration of sustainability into construction project management (Banihashemi et al., 2017; Sfakianaki, 2019). Sfakianaki (2019) synthesizes and evaluates the available literature with respect to critical success factors (CSFs) for sustainable construction by reviewing the most pertinent papers from three publishers: Emerald, Elsevier and Wiley. Banihashemi et al. (2017) presented a list of CSFs and customizes it for the context of developing countries by conducting some interviews and presenting the outcome in the form of a conceptual model, where the model is afterwards validated through the data from 101 completed questionnaires with partial least squares structural equation modelling (PLS-SEM) as the method of analysis. This study strived to get an alternative perspective by focusing on barriers to the integration of sustainability into construction project management. Barriers have been extracted from the papers and reports addressing the issue of sustainability and presenting barriers or drivers to it. Some review articles are also available in this field of study (Silvius & Schipper, 2014; Hakiminejad, Fu, & Titkanlou, 2015; Marcelino-Sádaba et al., 2015; Ali, Boks, & Bey, 2016; Thomé, Ceryno, Scavarda, & Remmen, 2016; Aarseth, Ahola, Aaltonen, Økland, & Andersen, 2017; Darko & Chan, 2017; Medl, Stangl, & Florineth, 2017; Nawaz & Koç, 2018; Sfakianaki, 2019). However, most do not go beyond exploring the drivers and success factors for the integration of sustainability into construction project management (Sfakianaki, 2019; Banihashemi et al., 2017).

A list of 30 barriers to integrating sustainability into construction project management is tabulated in Table 1, as the outcome of conducting a comprehensive literature review.

Table 1. List of barriers ranked based on RII values

Rank	Barrier	RII value
1	Lack of understanding of the potential self-benefits of proactivity and high economic risks that unsustainable practices may carry	0.8511
2	Insufficient cooperation between industries, academia and environmental organizations	0.8443
3	Lack of a systematic approach to planning and acting for the fulfilment of sustainability	0.8330
4	Lack of support from policy makers	0.8307
5	Unstable economy	0.8284
6	Lack of Organizational Support	0.8148
7	Improved environmental or social sustainability is not valued in internal capital allocation decisions	0.8080
8	Lack of sustainable practices in an organizations vision	0.8011
9	Sociocultural constraints; like poor public awareness and demand	0.7761
10	Corruption affecting the construction industry	0.7716
11	Lack of proven return on investment	0.7693
12	Lower priority for environmental or social equity issues	0.7682
13	Project managers do not possess the required KSAs (knowledge, skill, ability)	0.7670
14	Obstructive policies	0.7568
15	Companies employment strategies which does not measure sustainability knowledge and abilities	0.7545
16	Lack of data and transparency and information sharing between the construction firms and the suppliers	0.7477
17	Absence of studies and education on sustainable delivery of construction projects	0.7466
18	Political constraints and Inadequate legislation and legal enforcement by the government	0.7432
19	Lack of stakeholders' early engagement	0.7420
20	Difficulty in dealing with government agencies	0.7364
21	Lack of investment	0.7250
22	Poor market demand for green and recyclable construction materials	0.7170
23	Companies in developing countries change their unsustainable practices only if there is a proven return on investment	0.7159
24	Inadequate systems for managing information	0.7136
25	Lack of research addressing the issue and role of enablers in facilitating the successful implementation of green procurement in local construction industries	0.7045
26	Lack of formal education on sustainability	0.6773
27	Slow innovation diffusion	0.6773
28	Inadequate market supply of green products and services for comparison and selection of products	0.6670
29	Lack of an experienced and well-trained workforces with knowledge on sustainability practices in the construction industry	0.6614
30	Project management standards fail to address all sustainability aspects	0.6330
References	(Elkhalifa, 2016; Chang, Soebarto, Zhao, & Zillante, 2016; Gan, Zuo, Ye, Skitmore, & Xiong, 2015; Banihashemi et al., 2017; Hakiminejad et al., 2015; Wong, Chan, & Wadu, 2016; Broman & Robèrt, 2017; Tabassi, Ramli & Bakar, 2012; Ahsan, Ho & Khan, 2013; UNDESA, 2013; Perera, Rameezdeen, Chileshe, & Hosseini, 2014; Ojo, Mbowa, & Akinlabi, 2014; Varnäs, Balfors, & Faith-El, 2009; Silvius & Schipper, 2012; Aarseth et al., 2017; Local Government Association of NVS, 2009)	

## Methods

As discussed, barriers were extracted through a comprehensive review of the literature, resulting in a list of 30 barriers. The barriers are examined through a survey returning 176 questionnaires from Iranian construction industry professionals, as a developing country. Subsequently, relative importance index (RII), as illustrated in Eq. (1) is used to rank the barriers and distinguish the most important ones, following the lessons by (Holt, 2014).

$$RII = \frac{1_{n1} + 2_{n2} + \dots + A_{nA}}{AN}, \quad (1)$$

where:  $n1, n2, \dots, nA$  – number of respondents scoring response stem integers 1 to 5;  $A$  – largest integer on the response scale;  $N$  – number of respondent sample.

The  $A$  is equal to 5 in this research and  $N = 176$ .

## Findings

Table 1 illustrates the results of ranking barriers based on the RII values calculated for each variable. RII values are showing the importance of each factor (Holt, 2014). Higher RII value proves that respondents have assigned a higher score to the specific variable.

Ranking the barriers based on their RII value indicates that “Lack of understanding of the potential self-benefits of proactivity and high economic risks that unsustainable practices may carry”, “Insufficient cooperation between industries, academia and environmental organizations” and “Lack of a systematic approach to planning and acting for the fulfilment of sustainability” are the highest ranked barriers in this survey.

As illustrated in Table 1 “Inadequate market supply of green products and services for comparison and selection of products”, “Lack of an experienced and well-trained workforces with knowledge on sustainability practices in the construction industry” and “Project management standards fail to address all sustainability aspects” are the lowest ranked barriers of integrating sustainability into construction projects’ management in developing countries. This proves that construction professionals in Iran are expecting innovations like sustainability to be performed through an up-down approach rather than a bottom-up approach.

## Discussion and conclusion

This study presents a review of the concepts involved with integrating sustainability into construction projects’ management in developing countries. The review of literature listed 30 barriers which is subsequently assessed in terms of relative importance through a questionnaire survey administered to Iranian construction industry experts. This resulted in a dataset of 176 completed questionnaires. Based on the results of calculations, it is inferred that economic and regulatory barriers have a greater importance than items related to market and workforce awareness. To achieve societal changes at a scale and rate that are needed for sustainability to even be a possible outcome, Broman and Robèrt (2017) believe it is necessary to establish a thorough understanding, not the least among leaders, of the character, magnitude and urgency of the sustainability challenge as well as the self-benefit of competent proactivity for sustainability. Also a concrete methodological support for such proactivity is needed.

Today many leaders recognize climate change, shrinking biodiversity, poverty, erosion of trust, and several other problems. However, they typically do not know how the numerous problems are in fact symptoms rooted in a few overriding mechanisms of destruction of our ecological and social systems. It leads to missing opportunities and solutions that cause new and sometimes worse problems. Barriers like “insufficient cooperation between industries, academia and environmental organizations” and “lack of a systematic approach to planning and acting for the fulfilment of sustainability” follow suit hindering the penetration of sustainability in construction project management. There is a growing concern among industry recruiters in developing countries that students lack industry-relevant skills making them unemployable. On the other hand, students trust that getting a relevant degree assures them employability. This lack of systematic approach results in a major gap between academia and industry which lead to corporate entities recruiting employees with practical work experience whereas researchers do their studies in universities without considering workplace terms and issues. Besides these, environmental organizations in such countries are looked upon as obstructive organizations rather than supportive and value-adding ones.

Identifying the most influential barriers of sustainability offers invaluable insight for researchers, practitioners, and policy makers, in supporting the transition of project management practices towards fulfilling sustainability goals.

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