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Motivation and Owner Commitment for Improving the Delivery Performance of Green Building Projects: A Research Framework

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Abstract

This paper proposes a research framework for evaluating the relationship between motivation and owner commitment for improving the delivery performance of green building projects in the construction industry. The research framework can generate knowledge in a positivistic manner, and the quantitative methodology for planning and devising the survey method of data collection and the structural equation modelling technique of data analysis. Theoretically, the research framework can be modified or extended by other researchers for investigating the delivery performance of green building projects, while in practical terms, it will help in identifying how to increase project owners' commitment for improving the delivery performance of green building projects in the construction industry. Finally, a research agenda is proposed towards achieving the aim of establishing empirical relationship between motivation and owner commitment for improving the delivery performance of green building projects.

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Keywords: Delivery performance; framework; green building projects; motivation; owner commitment; theory

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1. Introduction

Building activities such as extraction, processing and transportation of raw materials, design, construction, operation and demolition adversely affect the environment and the ecosystem together [1] in form of emission of carbon dioxide to the atmosphere [2], excessive resources use and wastages, and greenhouse gas (GHG) emission [3]. In order to reduce the adverse effects of building activities, green building projects – which have minimum environmental foot print [4] are proposed as model of development in the building sector [5]. Green building projects are designed and constructed based on the principle of sustainable construction, whereby constructed products are created by using best-practice, clean and resource-efficient measures from the extraction of the raw materials to the demolition and disposal of its components [6, 7] thereby reducing the adverse effect of building activities on the environment and the ecosystem [8]. However, for these objectives to be achieved, there is need for enhanced project delivery of green building projects [9].

There are many factors which contribute to the successful delivery of green building projects. Of these, owner commitment (OC), or the commitment of project owners to the delivery of green building projects, is very important because it concerns project owners who are the most important of the participants involved in the delivery of green building projects [10], providing information concerning the mission and the overall aim of the project [11]. In addition, they dictate the course of project delivery of green building projects as key decision makers [12]. Therefore project owners drive the delivery of green building projects [13, 14]. As suggested by Bornais [15] and Korkmaz, Riley and Horman [16], OC is very important for successful delivery of green building projects.

However, there is very little evidence of OC, or that project owners exemplify their commitment to the delivery of green building projects in the construction industry, despite the enormous complexities in the delivery of green building projects, which ultimately affect delivery performance. For instance, green building projects require additional project delivery requirements such as energy modelling [17], while new and sophisticated features are installed in an integrated manner into the building system [18]. Additionally, multidisciplinary project participants, often with added competencies, have to work together in a non-sequential, iterative and interconnected manner [19]. Given these complexities, which are comparably higher than conventional building projects [20, 21], green building projects experience low delivery performance [22]. For instance, to account for the additional requirements posed by green building projects, higher cost is incurred [23].

To increase the level of OC, it is imperative to improve project owners' motivation. Originally motivation is majorly conceived as a psychological concept because it relates to human behaviour [24] and it describes the reasons why a person or a group of people act or behave in a certain way [25]. Additionally, it is the force acting either on or within a person or a group of people to initiate a behaviour or perform an action [26]. The concept of motivation is usually employed for accelerating the change from conventional to green building practices in the construction industry [27]. Similarly, the concept of motivation has been indicated to increase the level of OC to the delivery of green building projects in the construction industry [12, 15].

Although it is observable that motivation can be linked to owner commitment for improving the delivery of green building projects, there is currently no research exploring the perceived relationship. Specifically, there is no empirical support for the interdependency in the green building context. Thus as part of a larger research seeking to establish empirical relationship between motivation and owner commitment for improving the delivery performance of green building projects, this paper specifically proposes the research framework which identifies and describes the major elements, variable and constructs to be studied, and the presumed relationships [28, 29]. The research framework is useful to theory and practice in the following ways. First, the research framework provides a theoretical framework of research which can be modified or extended by other researchers for investigating the delivery performance of green building projects. Second, the research framework will help in identifying how to increase project owners' commitment for improving the delivery performance of green building projects in the construction industry.

2. Literature review

2.1 Research concepts and the linking theory

2.1.1 Motivation for green building practices

Within the green building context, motivation refers to the drivers compelling project owners towards green building practices [30]. Motivation is also key towards ensuring that other building stakeholders such as constructors constantly engage in green building practices. There are different drivers of motivation for green building practices in the building sector. These include: improved quality of life for users and/or occupiers of green buildings [31], altruistic belief that unsustainable practices and its effects on man and environment are real and detrimental [32–34], enhanced reputation and identity [35] and persuasive influence or inspiration from sustainability advocates, champions or leaders [30, 36]. Others include: high market appeal of green building projects [37] and financial [36, 38] and non-financial incentives [33, 38] from the government.

Broadly these drivers of motivation can be categorised into internal (IM) and external (EM) motivations on the basis of self-determination theory (SDT) of motivation. The SDT of motivation, which is the theory underpinning the concept of motivation as used in this paper, proposed that there are different drivers of motivation for an action or the performance of an action by a person or group of people [39]. When it is IM, action(s) are performed out of volition or personal endorsement of a person or group of people [39, 40]. IM occurs when the actors find the actions interesting, or satisfying such as when it aligns with their values, beliefs, norms and social concerns [41], an example of which is when project owners develop commercial green building projects to satisfy their social concern for increased productivity and reduced absenteeism [42–45]. As for the EM, actions are performed by a person or a group of people to obtain some separable outcomes such as tangible rewards, or avoid something negative such as government punishments [46, 47]. For instance, the installation of green building features by a project owner in order to obtain conditional financial incentives from the government.

2.1.2 Owner commitment (OC)

The evolution of OC to the delivery of green building projects can be traced to the mid-1990s, a period whereby the construction industry in UK was grossly underachieving. At the time, the construction industry experienced high level of project schedule and cost overruns, low productivity for extended period of time, particularly among the construction firms and general problems with high profile projects [48, 49]. To solve the problem, the reports of Latham [50] and Construction [49] were commissioned, and the main suggestion was that project owners should increase their activities and responsibilities in the project delivery process [51, 52]. Thereafter, project owners became more active in the delivery of construction projects, contributing activities such as innovation [48], and constructability [53], forming and building project teams [54, 55] and safety enhancement [56]. Currently, the construction industry is emphasizing more on green building mode of construction, and therefore, the involvement of project owners in the delivery of the green building projects is regarded as OC [11].

By definition, OC is the active and deliberate participation and involvement of project owners in the project delivery of green buildings [57]. It is also the level of dedication shown by the project owners towards the implementation of sustainable building features during the delivery of green building projects [58]. According to Olanipekun et al. [59], there are 9 indicators which exemplify OC to the delivery of green building projects, and summarized on Table 1 as OC1-9. Additionally, the indicators represent the specific ways or means through which project owners participate in the delivery of green building projects, especially at the design stage.

Table 1: Descriptions of the indicators of OC

Code	Indicators of OC
OC1	This is the educating of project team participants on how to achieve sustainable building concepts, by assuming project leadership and engaging in more research
OC2	The facilitation of the integration and close working relationships among project team members, mainly by assembling project team members who have intra-working experience early
OC3	The introduction of the intention to develop green building project early
OC4	The provision of vision statement, containing the goals and objectives, written in a clear and concise manner for the use of project participants, as the reason to develop green building projects
OC5	The commissioning of separate experts early in the design stage to employ one or more of the green building rating systems, to guide the green building delivery process
OC6	The provision of encouragements, either in the contract or project programs, for improving the performance of project participants
OC7	The selection of project participants with experience in, and capabilities for delivering green building projects
OC8	The empowerment of project participants to freely introduce and implement innovative green building solutions
OC9	The provision of top management support in project owner organisations, through making available technical staffers or by developing business case, for the delivery of green building projects

2.1.3 Delivery performance

The delivery of building projects is expressed in terms of delivery performance. The delivery performance of building projects expresses the efficiency of project delivery [60, 61], where efficiency expresses whether the resources were well used to attain the results [62]. For green building projects, delivery performance is evaluated on the basis of both traditional and sustainability metrics at the project completion stage [63, 64]. The traditional metrics include cost, schedule and quality performances [65], and together they form adequate measure of the delivery performance of green building projects (Franz et al., 2013). In addition, the sustainability metrics assess the level of greenness in green building projects after project completion [66, 67], through the level of sustainability rating [68, 69], the level of energy efficiency or energy savings [70] and the comfortability or the quality of indoor air [71].

Table 2: Delivery performance metrics

Code	Traditional & Sustainability delivery performance metrics
DP1	Cost performance
DP2	Schedule performance
DP3	Quality performance
DP4	Sustainability rating
DP5	Quality of indoor air
DP6	The level of energy efficiency

3. Findings

3.1 Proposed research framework

In line with Maxwell [29], the key concepts of the proposed research framework are motivation (M), owner commitment (OC) and delivery performance (DP). Additionally, the theory which underpins, one of the key concepts, i.e. motivation (M), is the SDT of motivation [72, 73]. Therefore the proposed theoretical framework is that, motivation (M), whether internal (IM) or external (EM), influences owner commitment (OC), for improving the delivery performance of green building projects. The research framework is illustrated in Fig. 1.

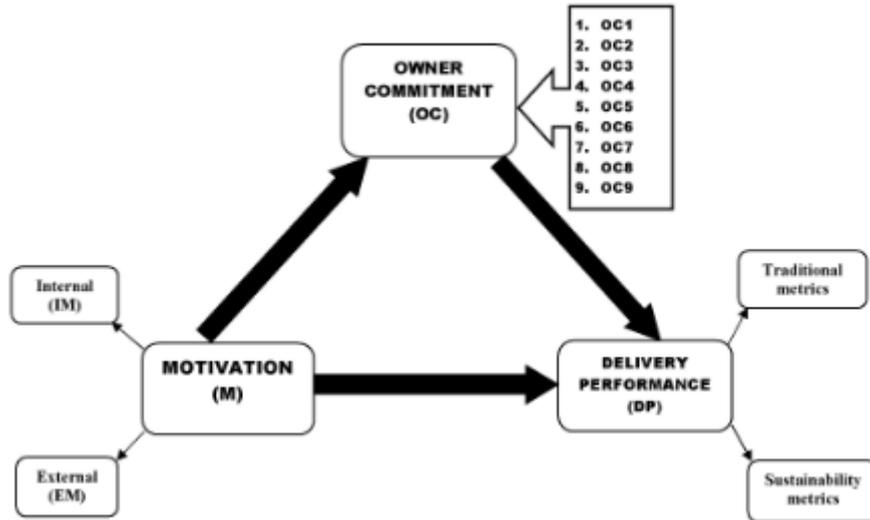


Fig. 1: Illustration of the proposed research framework

The arrows shown in Fig. 1 suggests the direction of proposed relationships among the concepts. Statistically, Fig. 1 suggests the presence of mediating or indirect effect, that is, motivation (M) influences owner commitment (OC), which in turn influences the delivery performance (DP). Hence OC mediates the relationship between M and DP. Based on Fig. 1, if OC completely accounts for the relationship between M and DP, it is full mediation, otherwise, it is partial mediation [74]. The concepts of the research framework are represented with variables in order to have clear and unambiguous operational definition that specifies how they will be measured and at what level of analysis [75]. The two latent factors of motivation (M) are IM and EM. The variables of owner commitments (OC) are OC1-8, and delivery performance (DP) are DP1-6.

3.2 Methodological and epistemological approaches

The research framework of research is explanatory in nature, as it attempts to “connect the dots”, by identifying causal concepts such as motivation (M), owner commitment (OC) for improving the delivery performance (DP) of green building projects [75]. The quantitative research methodology can test theories and concepts composed of variables, measure them with numbers and analyse them with statistical techniques [76], and as a result, it is proposed as the strategy or plan of action for establishing the relationship which may exists among the identified concepts in this paper [77]. This manner of knowing (epistemology) [77] is positivistic. Positivism reaches for objective truth, facts and laws by testing the reality of a theory or gather data about concepts/variables expected to be related to attain a linear cause-and-effect relationship [78]. As a result, a questionnaire survey is proposed for collecting data about the concepts/variables from project owners of green building projects, for testing the potential relationship among the concepts/variables. According to Boynton and Greenhalgh [79], the use of questionnaires offer an objective means of collecting information about people’s knowledge, such as the knowledge about the project delivery of green building projects. To evaluate the potential relationship among concepts, and between concepts and variables, structural equation modelling (SEM) is proposed as the method of data analysis [80]. Table 3 contains the illustration of the methodology and epistemology of the research framework.

Table 3: Summary of the methodological and epistemological approaches for the research framework

Aim	Epistemology	Methodology	Method of data collection	Method of Analysis
What is the research framework for examining whether motivation (M) influences owner commitment (OC) for improving delivery performance (DP) of green building projects?	Positivism	Quantitative	Questionnaire survey	Structural equation modelling (SEM)

4. Discussion

This paper proposes the research framework which identifies and describes the major elements, variable and constructs to be studied, and the presumed relationships in a larger research seeking to establish empirical relationship between motivation and owner commitment for improving the delivery performance of green building projects. The concepts which form the research framework are motivation (M), owner commitment (OC) and delivery performance (DP), and their potential to relate with one another for improving the delivery performance of green building projects was informed a priori (see [15, 27, 81]). The concept of motivation (M) is underpinned by the SDT of motivation thereby undergirding the research thinking that, motivation (M) influences owner commitment (OC) for improving the delivery performance of green building projects [72]. Based on the SDT theory of motivation, the concept of motivation is divided into internal (IM) and external motivation (EM). The former is when, for instance, project owners engage in delivering green building projects out of volition or personal endorsement [36, 39], while the latter suggests the delivery of green building projects for separable outcomes such as financial rewards [46, 47]. There are 9 identified indicators which exemplify owner commitment during the delivery of green building projects. These indicators, labelled OC1-9 are the variables of measure of OC. The delivery performance (DP) which refers to the efficiency in the project delivery of green building projects is divided into two concepts; traditional and sustainability metrics. The traditional metrics are cost, time and quality, while the sustainability metrics are level of greenness, energy efficiency and quality of indoor air. In line with Franz et al. [82], they form adequate measure of the delivery performance of green building projects.

The appropriate methodology for the research framework is the quantitative methodology, which allows the concepts to be operationalized into variables of direct measure. This is in contradiction with earlier studies which investigated the delivery performance of green building projects (e.g. [9, 10, 16, 65]). At the time, there were limited green building population [83], as a result, mixed methodology which included quantitative and qualitative methods were used to gather data and carry out analysis in order to obtain rigorous results [16]. Over time, green building population has increased, for instance, in Australia, over a thousand green building projects have been delivered by various project owners since 2004 [84]. According to Korkmaz, Horman [10], the use of quantitative methodology is thus useful to generate rigorous results on research investigations on the delivery performance of green building projects. Because the concepts/variables which form the research framework were informed a priori, the appropriate method of data collection about them is the survey method, through well designed questionnaire [75]. Similarly the applicable technique of data analysis is the SEM statistical method – which is capable of empirically relating one or more independent variables with one or more dependent variables [85]. Epistemologically, the application of this research framework for the research seeking to improve the delivery performance of green building projects generates knowledge in a positivistic manner.

5. Conclusion

The research framework, which links the concepts of motivation, owner commitment for improving the delivery performance of green building projects is proposed. The SDT of motivation is the theory underpinning the concept of motivation, which is categorised into internal (IM) and external (EM) motivation. The research framework follows the positivistic epistemology for knowledge generation, and the quantitative methodology for planning and devising the survey method of data collection, and the SEM technique of data analysis. The research

framework provides a theoretical framework of research for researchers seeking to investigate the delivery performance of green building projects. The framework will also help in uncovering how to increase project owners' commitment for improving the delivery performance of green building projects in the construction industry. The research framework is primarily for research seeking to establish empirical relationship between motivation and owner commitment for improving the delivery performance of green building projects therefore, a research agenda is outlined as follows.

- Reviewing the literature to elaborately describe the drivers of motivation(s) for green building practices and verify them empirically from project owners' perspectives. This will reveal the important drivers of project owners' motivation for increasing the delivery of green building projects in the construction industry.
- Reviewing the literature to elaborately describe the indicators of owner commitment during the delivery of green building projects and verify them empirically from project owners' perspectives. This will provide more information on the level of OC towards improving the delivery of green building projects.
- Establishing empirical relationship between motivation and owner commitment using SEM.
- Establishing empirical relationship between owner commitment and delivery performance of green building projects.
- Establishing the mediating effect of owner commitment in the relationship between motivation and delivery performance of green building projects. This will reveal the additional areas where owner commitment can be influential to the delivery of green building projects.

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