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Organizational Factors Influencing the Sustainability Performance of Construction Organizations

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Abstract: Construction projects contribute significantly to the growth of countries in terms of GDP and employment opportunities. However, construction organizations are often criticized for not adopting sustainable practices in delivering their projects. Underpinned by the resource-based theory (RBT) this research aims to investigate the organizational factors influencing the sustainability performance of construction organizations. This study used a mixed method approach in which the data was collected from the top management of Australian construction organizations. PLS-SEM was used to analyze the data. The findings revealed that, among the five key factors, business strategies, technological capabilities, and organizational culture are found to have a significant positive impact on the environmental sustainability performance of construction organizations. Also, it is found that the organizations' social sustainability performance is positively influenced by their organizational culture and business strategies. The research findings have several practical implications, such as the construction companies could use the operationalized measurement items of each determinant (i.e., organizational resources and capabilities) to self-assess and improve their organizational practices, which will help them develop strategies for improved sustainability performance.

Keywords: sustainability performance; construction organizations; tripple bottom line

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1. Introduction

The construction industry is one of the key contributors to the Australian economy, contributing to about eight per cent of the gross domestic product (GDP) and employing 1.1 million people [1] Yet, the industry is also long known as one of the main producers of wastes and greenhouse emissions [2,3]. As such, with the increasing awareness about sustainability, construction organizations are facing constant pressure to minimize the impact of their business actions on the environment and society. As Khalili [4] highlights, the concept of sustainability is built around the notion of reducing the destructive impacts of a nation's socio-economic and urban development on the well-being of the society as well as the environment. In accepting this, Dyllick and Hockerts [5] defined organizational sustainability as "meeting the needs of a firm's direct and indirect stakeholders (such as shareholders, employees, clients pressure groups, communities, etc.) without compromising its ability to meet future stakeholder needs as well", p. 133. Within these boundaries, this research investigates the organizational factors that can contribute towards crafting and implementing their sustainable development principles and initiatives for the well-being of all relevant stakeholders in construction.

Hitherto, many studies (e.g., [6–9])) have investigated the sustainability practices of construction organizations and noted that environmental and social commitments are seen as an extra expense rather than a benefit. However, improving organizational sustainability is not an easy process as it may require organizations to analyze their external influences and change their strategic endeavor and behavior, toward improving sustainability performance. According to Bansal and Roth [10] the four main factors of organizational sustainability include regulation; stakeholder pressure; business opportunities, and moral motivations. In accepting this, Linnenluecke and Griffiths [11]) and Epstein [12] further clustered these factors into internal and external drivers, pointing out that government regulation and stakeholder pressure as key external drivers of organizational sustainability. They operationalized internal organizational factors such as organizational culture; human resource management; supply chain management; employee enablement; and the number of monetary resources assigned to sustainability. Of these, Epstein [12] emphasized the importance of organizations to develop a culture that promotes sustainability among employees and increases their awareness of diversity, employee rights, and environmental safety for better sustainability performance. Adding to this, studies (e.g., Dyllick and Hockert, 2002; Banerjee et al., 2003; Robin and Poon, 2009; Gadenne et al., 2009; Zhang et al., 2022) (e.g., [5,13–16]) have also found that organizational supply chain and technological innovation are key enablers of sustainability performance.

Despite the considerable amount of work done regarding sustainability, it appears that little effort has been placed to empirically examine organizational sustainability using an integral approach and ways to improve the sustainability performance of construction organizations. Recognizing these gaps in knowledge, this research aims to investigate the organizational factors influencing the sustainability performance of construction organizations. Following this aim, the specific objectives are to (i) identify the key factors of organizational sustainability performance in construction organizations and (ii) examine the impact of key factors on the three dimensions of sustainability performance. It is hypothesized that construction organizations' sustainability performance is collectively influenced by their: organizational culture (OC); supply chain capabilities (SC); technological capabilities (TC); employees' skills and attitudes (ESA); and business strategies (BS). The research adopted a mixed-method approach whereby data was collected via an online questionnaire and interviews with senior managers of large and medium-sized construction organizations in Australia. Subsequently, the collected data was analyzed using the Partial Least Square Structural Equation Modelling technique.

2. Literature Review

2.1. Organizational Sustainability

Sustainability has often been touted to be a three-dimensional concept, involving environmental, social, and economic sustainability. Environmental sustainability focuses on the impact of human activity on the carrying capacity of the ecosystem (such as materials, energy, land, water, etc.). Social sustainability refers to the social well-being of the people, balancing the need of an individual with the need of the group (equity). Lastly, economic sustainability emphasizes the efficient use of resources to enhance operational profit and maximize market value [17]. As Barkemeyer et al. [18] pointed out, organizations are an integral part of the economy, contributing to the growth of a nation; thus, without their support and commitment, the long-term goal of achieving the sustainability targets and improving the overall sustainability performance is not possible. The concept of sustainability has been increasingly applied as an organizational concept since the release of the Brundtland report in 1987. Despite this, it seems that there is no widely accepted definition for organizational sustainability and that organizational sustainability has been conceptualized as the application of sustainable development principles into organizational operation. In accepting this, Elkington [19] developed the triple-bottom-line (TBL) concept of organizational sustainability, pointing out that it is about finding the balance between the three main dimensions of sustainability. However, Gray [20] (2010) questioned the usefulness of TBL-driven organizational sustainability, criticizing that it is almost impossible to find the right balance between the three dimensions of sustainability within the business environment fueled by the profit-driven nature and opportunistic behaviors of commercial entities. From the other lens, Chang [21] and Montiel [22] mapped the evolution of corporate social responsibility (CSR) and organizational sustainability and noted that researchers are increasingly conceptualizing and operationalizing these two concepts in a similar way using the stakeholder approach. For consistency and ease of discussion, the term "organizational sustainability" is used hereinafter.

In looking at organizational sustainability performance, Schaltegger and Wagner [23] defined it as "the performance of a company in all areas and for all drivers of corporate sustainability"(p. 2). In supporting this, Orlitzky and Swanson [24] highlighted that the goal of organizational sustainability performance is to see if organizations' activities are associated with sustainable development, considering their obligations to society on the institutional, organizational, and individual levels. This is in line with Artiach et al. [25] who suggested that organizational sustainability performance measures the level to which a firm adopts environmental, social, economic, and governance factors into its operations, and in turn how its operations would impact the firm's performance; hence, the society and environment. Admittedly, one of the most key challenges for organizations is to find and develop a standardized and practical methodology for measuring sustainability performance and subsequent comparison [26,27]. The Dow Jones sustainability index (DJSI), ISO2600 and the Global Reporting Initiative (GRI) are some frameworks adopted by larger and well-established companies for evaluating their organizational sustainability performance. In this research, an attempt was made to integrate the triple-bottom-line concept with the GRI guideline towards measuring the organizational sustainable performance of construction firms, following the techniques recommended by [9,25,28]

2.2. Sustainability Performance of Construction Organizations and Their Key Drivers

Over the past two decades, a considerable amount of research has documented the current implementation status, and different sustainability initiatives adopted by construction firms across different countries. For example, in the UK, Myers [6] examined the attitudes of UK construction companies towards sustainability on the basis of their public-disclosure information and found that some of the exceptionally large construction firms were beginning to acknowledge sustainability. However, smaller and unlisted firms were slow towards embracing a positive attitude toward sustainability. This phenomenon is reflected in Mills and Glass's [7] study, documenting that the slow implementation of sustainable initiatives in UK companies is mainly due to the skill deficit of construction professionals in sustainable practices and technologies. In the context of Singapore's construction industry, Oo and Lim [29] studied the attitudes and behavior of 34 contractors towards environmental sustainability and found that the contractors are increasingly recognizing the importance of sustainable management as a form of competitive advantage. The findings tend to also add weight to Ofori et al.'s [30] survey of 53 Singaporean construction firms that most of the firms adopted a wait-and-see attitude. Other studies have also been conducted across Hong Kong (e.g., [31,32]), Australia (e.g., [33,34]), Ghana (e.g., [35], China (e.g., [16,36]). Some of the common themes or issues that arise from these studies include: (i) their clients were not supportive of sustainable initiatives; (2) cost and time are still the main performance criteria; (3) sustainability implementation is compliance driven; (4) the level of organizational sustainability implementation is dependent on organizational profitability; and (5) implementation of organizational sustainability is still at its infancy within the construction industry.

Unlike studies within the mainstream literature, little was done in construction to explore different mechanisms for improving the sustainability performance of construction organizations. For example, in the United States, Winn [37] interviewed four firms of different age, size, ownership structure, and from different industry sectors, exploring the key drivers for innovative environmental policy changes and found that pressure from different stakeholders and top management commitment are the most significant drivers of sustainability. Around the same time, Lawrence and Morell [38] analyzed environmental management practices and their drivers of eight US manufacturing firms and found that interaction among these four, i.e., motivation (through regulation, competitive advantage, top management); opportunity (defined as a recognized occasion for change such as the introduction of a new product); resources (financial, technical, and informational); and processes (such as line management involvement, cross-functional team) would lead to proactive environmental sustainability practices. In exploring the antecedents of corporate environmental orientation and environmental strategy of US companies. Banerjee et al. [13] undertook a multigroup path analysis of North American companies, they concluded that public concern, regulatory forces, competitive advantage, and top management commitment are among important drivers of corporate sustainability. Their findings show that regulation, competitive advantage, and top management commitments are important drivers for organizational sustainability. Senge et al. [39] outlined that it is impossible to achieve sustainability without innovation and that innovation is best accomplished in a culture that embraces and adopts learning and change. This is in line with Hartman [40] who emphasized that in order to improve sustainability performance companies need to implement an organizational culture, which inspires learning and innovative behavior. Several significant drivers of organizational sustainability performance were also identified: employees' skills and attitudes (e.g., [15,41]); supply chain capabilities [42]; and technological capabilities [43–45]. Interestingly the review above gives rise to the following questions within the context of construction:

- What kind of organizational factors should construction organizations focus on in their efforts to improve different dimensions of sustainability performance?
- How could different factors collectively and interactively influence different dimensions of sustainability performance?

Adding to the above questions, the review also reveals that little or no study has been done to empirically examine the sustainability performance of construction organizations using an integral approach. Furthermore, most of the construction studies used the project as the unit of analysis but did not consider the organization itself as the subject matter. As Oyewobi et al. [46] highlighted, higher emphasis should be placed on the construction organization itself as sustainability performance involves interdependency of various organizational attributes.

3. Theoretical Framework and Hypothesis Development

3.1. *Resource-Based Theory (RBT)*

This study used Barney's [47] RBT to underpin the conceptual framework of sustainability performance in construction. Within the premises of RBT, sustainable competitive advantages are reaped by a firm through efficient, effective, and successful utilization of strategic resources including assets, competencies, and capabilities [47]. Many studies have used RBT to study the impact of organizational capabilities and strategies on its sustainability performance (e.g., [48–51]).

In this study, it is postulated that organizational sustainability performance comprises three dimensions—social sustainability performance (SSP); environmental sustainability performance (ESP); and economic sustainability performance (ECSP)—and that organizational resources and capabilities form the foundation for firms to configure and implement their strategies for improving their organizational sustainability performance; whereby managers would incorporate, build, and reconfigure their resources and capabilities into diverse strategies that allow them to achieve sustainability targets. The resources and capabilities identified include (i) organizational culture (OC); (ii) employee skills and attitudes (ESA); (iii) supply chain capabilities (SC); (iv) technological capabilities (TC); and (v) business strategies (BS). The formulation of respective hypotheses involving different types of resources and capabilities and dimensions of organizational sustainability performance is shown below.

3.1.1. Organizational Culture (OC)

Organizational culture (OC) can be viewed as a set of values, attitudes, behavior, and patterns organizations learn over a period of time that helps in determining their employees' manner [52]. As Senge et al. [39] highlighted. sustainability cannot be achieved without innovation, and innovation is best achieved in a culture that embraces and fosters learning and change. This tends to add weight to Hartman's [40] assertion concerning the importance for firms to adopt a learning organizational culture as this would encourage innovative behavior and no-blame attitudes; hence fostering employees' commitment to achieving targeted organizational sustainable performance. Therefore, the following hypotheses are developed:

H1a. *Organizational culture (OC) could positively influence the environmental sustainability performance (ESP) of construction organizations.*

H1b. *Organizational culture (OC) could positively influence the social sustainability performance (SSP) of construction organizations.*

H1c. *Organizational culture (OC) could positively influence the economic sustainability performance (ECSP) of construction organizations.*

3.1.2. Supply Chain Capabilities (SC)

Akintoye et al. [53] defined a construction supply chain as a "process of strategic management of information flow, activities, tasks, and processes, involving various networks of organizations and linkages (upstream and downstream) involved in the delivery of quality construction products and services through the firms, and to the customer, in an efficient manner" (p. 161). Hitherto, many researchers have ascertained the positive relationship between supply chain capabilities and sustainability performance (e.g., [54,55]). To this, Krause et al. [42] argued that an organization can only achieve improved sustainability performance if its supply chain is sustainable and aligns with the firm's strategic direction. This tends to support Adetunji et al.'s [56] findings that construction contractors who integrated sustainability issues in the supply chain obtained substantial business benefits such as improved image, legislative compliance, and cost savings. More recently, Balasubramanian and Shukla's [57] study of the supply chain capabilities and the environmental performance of UAE construction contractors has also shown that effective supply chain practices could positively influence a firm's environmental performance. As such, it is hypothesized that:

H2a. *Supply chain capabilities (SC) could positively influence the environmental sustainability performance (ESP) of construction organizations.*

H2b. *Supply chain capabilities (SC) could positively influence the social sustainability performance (SSP) of construction organizations.*

H2c. *Supply chain capabilities (SC) could positively influence the economic sustainability performance (ECSP) of construction organizations.*

3.1.3. Technological Capabilities (TC)

According to Goulding and Alshawi [58] technology can be seen as an organization's capability to integrate and transform its resources, processes, and knowledge into desired outcomes. This is also shared by Thrope et al. [59] who argued that the use of technological capabilities to improve efficiency and productivity and facilitate training and development. All these will in turn collectively help improve the sustainability performance of construction organizations. Subsequently, Stadel et al. [60] found the use of technological capabilities integrated with life-cycle cost analysis (LCA) could be used to calculate the operational energy usage and carbon emissions of materials and transportation; hence help to monitor and improve the sustainability performance of construction projects. As such, it is hypothesized that:

H3a. *Technological capabilities (TC) could positively influence the environmental sustainability performance (ESP) of construction organizations.*

H3b. *Technological capabilities (TC) could positively influence the social sustainability performance (SSP) of construction organizations.*

H3c. *Technological capabilities (TC) could positively influence the economic sustainability performance (ECSP) of construction organizations.*

3.1.4. Employees' Skills and Attitudes (ESA)

Employees are generally considered the most significant asset of an organization [61]. The resource-based view of the firms highlighted the importance of employees' skills and attitudes towards organizational performance [47]. Many studies have noted a positive link between employees' knowledge, experience, capabilities, skills, and commitment to organizations' sustainability performance [62,63]

As construction is a labor-intensive industry, if employees are trained for sustainability, they can be a source of better performance and competitive advantage. Singh [64] emphasized that skilled employees help organizations in achieving improved productivity and sustainability. This view is also supported by Hamadamin and Atan [65] who insisted that the tacit knowledge of workers is very valuable for organizational performance in construction due to the intrinsic characteristics of the industry. Therefore, the following hypotheses are developed:

H4a. *Employee's skills and attitudes (ESA) could positively influence the environmental sustainability performance (ESP) of construction organizations.*

H4b. *Employee skills and attitudes (ESA) could positively influence the social sustainability performance (SSP) of construction organizations.*

H4c. *Employee skills and attitudes (ESA) could positively influence the economic sustainability performance (ECSP of construction organizations.*

3.1.5. Business Strategies (BS)

Barney [66] defined business strategies as outcomes generated from the allocation and configuration of resources and capabilities, and in turn enable organizations to maintain or improve their performance. To this, over the past two decades, organizational researchers have mutually agreed that business strategies are one of the key enablers of increased organizational performance and competitiveness, by responding to the changes in the business environment and stakeholders' expectations of sustainability-related social, legal, political, and economic requirements and trends [67–70]. As such, it is hypothesized that:

H5a. *Business strategies (BS) could positively influence the environmental sustainability performance (ESP) of construction organizations.*

H5b. *Business strategies (BS) could positively influence the social sustainability performance (SSP) of construction organizations.*

H5c. *Business strategies (BS) could positively influence the economic sustainability performance (ESP) of construction organizations.*

4. Methodology

This study used a mixed-method approach [71] and an online structured questionnaire survey was specially designed to collect data from prospective respondents who were listed as the top 100 residential and commercial construction organizations under the Housing Industry Australia (HIA) registry. A check-and-merging process was conducted to determine the eligibility and potential cross-over of those prospective respondents from the two categories. Overall, 187 organizations were identified and formed the sampling frame. The target groups of large and medium-sized construction organizations were selected for this research. Small-sized organizations were excluded because (i) they mostly work as sub-contractors of large and medium-sized organizations, (ii) they are usually involved in small repair and maintenance work only, and (iii) they may not exhibit sustainability practices on a comprehensive scale.

In this research, the online structured questionnaire comprised nine parts. First, respondents were requested to provide general information about the demographic characteristics of their organization such as year of establishment and types of ownership. In the subsequent sections, respondents were requested to respond to eight statements concerning their organizational practices and procedures on organizational culture (OC), four statements about the supply chain capabilities (SC), four statements about technological capabilities (TC), five statements about Business strategies and four statements about employees' skills and attitudes (ESA) based on a 7-point Likert scale ranging from 1 "Strongly disagree/never" to 7 "Strongly agree/Always". In the last section, an open-ended question was included to allow respondents to share their opinion on what they perceive as the most important driver towards achieving sustainable performance. This thus provides us with richer qualitative data to support the findings. The questionnaire was pre-tested and pilot-tested, and necessary amendments were made before the launch of the industry-wide survey.

A probability sampling method was employed whereby invitation emails, addressed to management of respective companies (i.e., company owner, managing director, senior management) were sent using the contact details obtained from the sampling frame generated. To increase the validity of the survey responses, company management was kindly requested to forward the invite to the key informant whom they thought would be the best person to respond to the questionnaire. To increase the response rate, a reminder email was sent after 14 days from the initial invitation. A total of 42 valid responses were collected. This represents a response rate of 22.45% which is reasonable considering the low rate of responses in a common issue across most construction industry research such as [72–74]. The relatively small sample size is not a major problem for this study as it used the PLS-SEM approach for data analysis, which uses bootstrapping to obtain statistical significance among relationships.

As shown in Table 1, 9 companies were publicly owned and 33 were privately owned. The company age ranged from 5 to 104 years, with an average age of 54.5 years. The sample contained 30 (71.42%) medium-sized companies and 14 (28.58%) large-sized companies. All respondents were from senior management levels (including managing directors, executive directors, senior project managers, and sustainability managers); thus they were the key decision-makers of their organization. In addition, the respondents had extensive working experience in the Australian construction industry, ranging from 5 to 37 years. Most respondents (83.3%) had between 16 and 30 years of experience.

In this study, the structural equation modeling (SEM) partial least square (PLS) approach was adopted, via the Smart PLS 3.0 statistical software, using them to analyze the dataset. SEM has been used in social science research to develop and test theories using survey data for studies in business marketing (e.g., [75–77]) organizational behavioral management [75] and construction management (e.g., [74,78,79]). The PLS-SEM approach was preferred over the covariance-based SEM approach because (i) the former is best suited for the exploratory nature of this research; (ii) it does not require a large sample size (30–100 datasets) to analyze complex relationships [80]; (iii) PLS-SEM is distribution-free and hence considering the unknown distribution of the measurement items, it is appropriate for this study [75]. Unfortunately, these requirements could not be fulfilled by the use of the covariance-based SEM approach. For consistency and ease of reference, the corresponding terms 'construct' and 'measurement items' were used interchangeably with organizational factors and the measures of respective organizational factors.

Table 1. Sample Profile.

Description	Frequency	Percentage
Characteristics of companies		
Type of organization		
Publicly owned	9	21.4%
Privately owned	33	78.6%
Scope of construction business		
Residential construction	8	19%
Residential and Commercial	14	33.3%
Commercial	10	23.8%
Residential/Commercial/Infrastructure	3	7.1%
Commercial/Infrastructure	7	7.1%
Age		
<20 years	9	21.4%
21–50 years	18	42.9%
>50 years	15	35.7%
Size of workforce		
Small (0–20)	0	0
Medium (20–200)	30	71.42%
Large (>200)	12	28.58%
Characteristics of respondents		
Designation		
Director (i.e., managing director, executive director)	8	19%
General Manager	2	4.8%
Senior Manager (senior project manager, development manager, sustainability manager)	31	73.8%

A two-pronged research process was conducted involving the use of confirmatory factor analysis (CFA) followed by the path analysis procedures. Of these, for the CFA procedure, several guidelines were used to assess the validity of the constructs and their explanatory power: (i) factor loading should be above 0.70; (ii) Cronbach's alpha coefficient should be between 0.6–0.90 based on Hair et al. [75]; (iii) composite reliability score should be 0.70 [75]; (iv) average variance extracted (AVE) value should be 0.50 and the square-rooted AVE scores of each construct should be greater than their correlation coefficients with other constructs [81]; and (v) the Heterotrait–Monotrait ratio of Correlation (i.e., HTMT) value should be below 0.90 [75]). The results and analyses of the measurement models are discussed below.

For the second procedure, the structural model (see Figure 1) was built to test the hypotheses above mentioned. By using the path analysis technique. The explanatory power of the structural model was evaluated by examining the amount of variance (R^2) accounted for by the predictor constructs for each predicted construct. Furthermore, the statistical significance of path coefficients (i.e., the strength of those hypothesized relationships) was determined by their respective t-statistics generated based on the bootstrapping process of 5000 samples as suggested by Hair et al. [75]. Four guidelines, recommended by Hair et al. [75], were adopted here: (i) the predictor construct should explain at least 15% of the variance in a predicted construct; otherwise, the predictor construct should be eliminated and the model will be re-estimated; (ii) a predictor construct's R^2 value of 0.75, 0.50, and 0.25 will be considered as substantial, moderate, and weak, respectively; (iii) a predictor construct's tolerance (VIF) value should be at least 0.20 (or lower than 5); and (iv) a predictor constructs f^2 value of 0.02, 0.15, and 0.35 will correspondingly indicate small, medium, or large effect on a predictor construct. Results are discussed in the subsequent section.

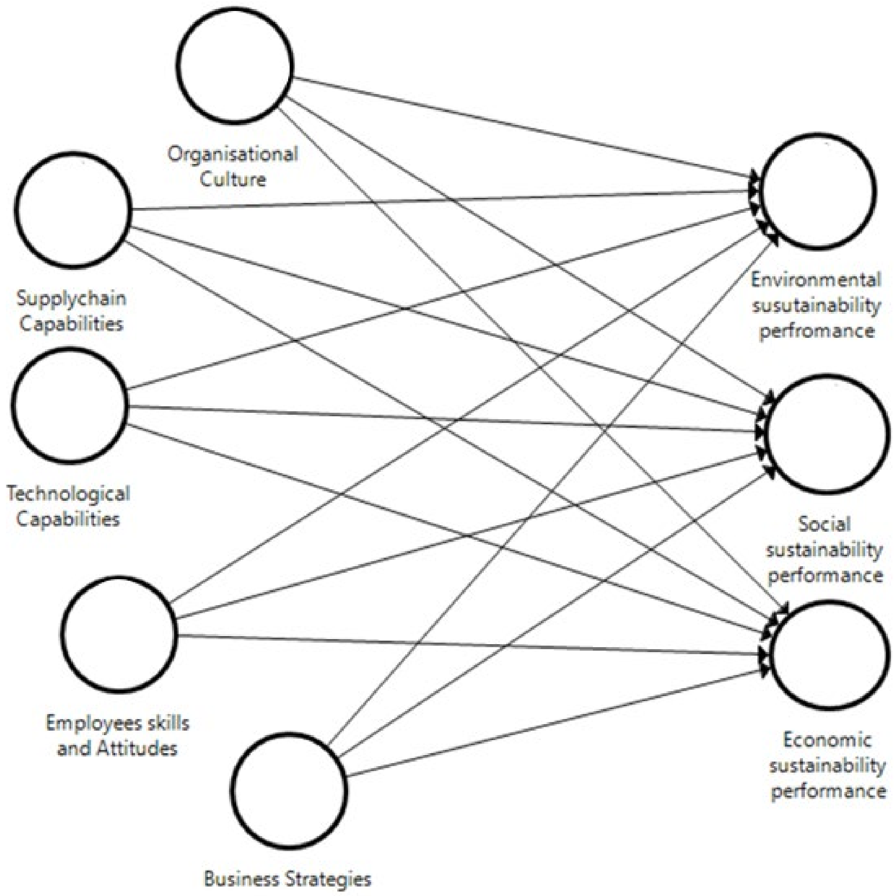

Figure 1. Structural model.

5. Results

5.1. Measurement Models

The reliability and validity of the reflective measurement models were first assessed. The measures of reliability include indicator reliability and internal consistency reliability. Indicator reliability was assured by calculating the loading of each indicator on the construct that it was intended to measure [75]. Table 2 summarizes the results of the eight measurement models, characterizing OC, TC, SC, BS, ESA, ECSP, ESP, and SSP. It can be seen that the factor-loading values of respective measurement models were greater than 0.60, and the t-values were all greater than 2.0 thus providing a high level of construct reliability. The internal consistency reliability was determined by examining the composite reliability (CR) and Cronbach's alpha coefficients. The results in Table 2 indicated that all CR values of the constructs were higher than 0.70 and that the Cronbach's alpha coefficients of all constructs were higher than the threshold of 0.60 [75]). Collectively, this attested to a high-level internal consistency reliability.

5.2. Structural Model

The path analysis results of the structural model are summarized in Table 3 and Figure 1. The R^2 values of all predicted constructs range from 0.245 to 0.822 and are significant at $p < 0.05$. The R^2 values of the respective constructs in this structural model are well above the required threshold value of 10%. This result thus suggests that the hypothesized relationships specified in the model are informative. Hair et al. (2016) [75] suggested that R^2 values of 0.25, 0.5, and 0.75 could be described as weak, moderate, and substantial predictive accuracy, respectively.

Table 2. Validation of measurement items.

Construct	Measurement Items	Description	Factor Loading	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Organizational culture (OC)	OC1	The leadership always inform employees on organization's business objectives	0.742	0.931	0.934	0.667
	OC2	There is an atmosphere of trust and respect amongst top management and employees	0.756			
	OC3	My organization encourages employee participation in decision making	0.78			
	OC4	My organization provides support to employees to achieve individual and organisational goals	0.856			
	OC5	Employee's training is seen as an investment	0.884			
	OC6	My organization promotes open conversation between supervisors and subordinates	0.782			
	OC7	Sustainability is top priority of organizations' leadership	0.873			
	OC8	My organization encourages cultural changes to incorporate sustainability in all organisational levels	0.89			
Supply chain capabilities (SC)	SC1	Always focuses on green purchasing (recycle, reuse and reduction in material	0.929	0.683	0.858	0.752
	SC2	Audits the suppliers to evaluate their social and environmental performance	0.932			
	SC3	Works with suppliers to help them reduce environmental impacts through change in product design and material use	0.949			
	SC4	Provides training to the procurement officer about performance evaluation and monitoring of suppliers	0.926			
Technological capabilities (TC)	TC1	Uses new innovative methods to reduce material use	0.862	0.831	0.965	0.873
	TC2	Uses latest technology for employee's safety (for example using RFID/GPS for tracking employees on complex sites	0.776			
	TC3	Has efficient system to communicate and share real time information with employees	0.718			
	TC4	Has capacity to monitor its sustainability performance	0.894			
Business strategies (BS)	BS1	Forms partnership with clients to improve sustainability performance	0.902	0.926	0.944	0.771
	BS2	Forms partnership with sub-contractors to improve sustainability performance	0.893			
	BS3	Creates business case for sustainability through reuse and recycling of material	0.893			
	BS4	Formally measure and report sustainability	0.856			
	BS5	Encourages clients to pay a little extra to achieve long term sustainability	0.844			
Employee Skills and Attitudes (ESA)	ESA1	Positive attitude on sustainability	0.901	0.886	0.922	0.747
	ESA2	Employees' knowledge and skills in using IT	0.927			
	ESA3	Employees' knowledge and skills in material and equipment handling	0.877			
	ESA4	Training to upgrade employees' knowledge on new health and safety regulations	0.741			
Environmental Sustainability Performance (ESP)	ESP1	Assesses and manages the environmental impacts of its activities	0.9	0.903	0.944	0.705
	ESP2	Uses renewable energy	0.8			
	ESP3	Considers land use and biodiversity in business decision	0.866			
	ESP4	Makes an effort to minimize air, water, and other forms of pollutions	0.793			

Table 2. *Cont.*

Construct	Measurement Items	Description	Factor Loading	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
	ESP5	Seeks to improve energy efficiency in product and services	0.831			
	ESP9	Tries to reuse and recycle materials	0.799			
	ESP10	Makes initiatives to reduce direct and indirect greenhouse gas emissions	0.859			
Social Sustainability Performance (SSP)	SSP5	Works with community organisations to organize social and fundraising events	0.876	0.906	0.931	0.732
	SSP6	Sponsors sports events and other community causes	0.902			
	SSP7	Donates cash to support community in difficult situations	0.935			
	SSP8	Encourages employees to do volunteer work during working hours	0.78			
	SSP10	Works on projects to involve local communities	0.77			
Economic sustainability Performance (ECSP)	ECSP1	Has increased the market share	0.851	0.667	0.841	0.604
	ECSP2	Has increased the profit margin	0.72			
	ECSP4	Has increased returns to shareholders	0.88			

Table 3. Validation of structural relationships.

Hypothesis	Relationship	Path Coefficient	R^2	f^2	Inference
Environmental sustainability performance					
H1a	OC-ESP	0.205 *	0.833 **	0.058 *	S
H2a	SC-ESP	0.304		0.059	NS
H3a	TC-ESP	0.141 *		0.252	S
H4a	ESA-ESP	−0.194		0.031	NS
H5a	BS-ESP	0.486 *		0.14	S
Social sustainability performance					
H1b	OC-SSP	0.589 *	0.682 **	0.206	S
H2b	SC-SSP	0.255		0.033	NS
H3b	TC-SSP	−0.245		0.024	NS
H4b	ESA-SSP	−0.22		0.016	NS
H5b	BS-SSP	0.504 *		0.16	S
Economic sustainability performance					
H1c	OC-ECSP	0.15	0.461 *	0.021	NS
H2c	SC-ECSP	0.304		0.016	NS
H3c	TC-ECSP	0.141		0.003	NS
H4c	ESA-ECSP	−0.384		0.064	NS
H5c	BS-ECSP	0.317		0.13	NS

Note: S and NS denote supported and not supported, respectively. * significant at $p < 0.05$. ** significant at $p = 0.00$.

Turning to the effect size (f^2) of all predictors constructs on the predicted constructs Table 3 shows that the effect sizes of the respective path range from 0.001 to 0.975. Hair et al. [75] suggested that values of 0.02, 0.15, and 0.35, respectively, represent small, medium, and large effects of the predictor construct on the predicted constructs whereas the effect size value of less than 0.02 indicates that there is no effect [75]. For example, out of all the five predictors of environmental sustainability performance (ESP), the effect size of business strategies (BS) is much higher (0.165) than the other predictors. Even though some of the constructs individually had little effect on predicting the dependent constructs collectively, the results indicate that the model explained the variance in the dependent constructs quite well. All these collectively indicate that all predictor constructs are informative and have moderately explained the variance in their predictor constructs. For hypothesis testing, a one-tail test was used.

6. Discussions

Figure 1 and Table 3 show that 15 hypotheses were built around the relationships between the key organizational factors and sustainability performance. It is notable that no significant factors were found to drive an organization's economic sustainable performance (ECSP) in this study. The results concerning how respective organizational factors could influence organizations' ESP and SSP are discussed below.

6.1. Drivers of Environmental Sustainability Performance (ESP)

It can be seen in Table 3 that the five organizational constructs have collectively explained about 83.3% (R^2 value of 0.833) of the variance in environmental sustainability performance (ESP) which is also statistically significant at $p < 0.05$. Of these, business strategies (BS; β = 0.486, f^2 = 0.14), technological capabilities (TC; β = 0.141, f^2 = 0.252), and organizational culture (OC; β = 0.205, f^2 = 0.058) were found to have significant positive impact on an organization's environmental sustainability performance (ESP). Therefore, hypotheses H1a (i.e., organizational culture (OC) positively influences environmental sustainability performance (ESP)), H3a (i.e., technological capabilities (TC) positively influence environmental sustainability performance (ESP)), and H5a (i.e., business strategies (BS) could positively influence environmental sustainability performance (ESP)) are supported.

Adding to the above, it is notable that business strategies (BS) were found to pose the largest positive impact (β = 0.486, f^2 = 0.175) on the environmental sustainability performance of the organization (ESP). Further to this, Table 2 shows that BS is significantly characterized by a partnership with clients and sub-contractors to improve sustainability performance (BS1) via the (ii) creation of a business case for sustainability through reuse and recycling of material (BS3), (iv) measuring and reporting sustainability, and (v) encouragement to clients to pay a little extra to achieve long term sustainability (BS5). In an attempt to determine the correlation between the measurement items of BS and ESP, we found that there is high (i.e., R > 0.70) positive correlation between B1 and ESP1; ESP3; ESP4; ESp5; and ESP9. One possible explanation here is that by forming an effective partnership with clients and sub-contractors, contractors are more likely to be able to: assess and manage the environmental impact of their activities; consider land use and biodiversity in the business decision; try to minimize air, water, and other forms of pollutions and seek to improve energy efficiency in product and services. Interestingly, one of the respondents highlighted:

> " ... when a sustainability strategy is developed in collaboration with the CEO, General Managers of various departments, and external contractors, we could obtain a better result due to the buy-in from respective stakeholders ... " [Respondent 42]

The above findings tend to add weight to Dyllick and Hockert's (2002) [5] conclusions that, for better implementation of sustainable initiatives and fulfillment of sustainable performance, management should place greater emphasis to integrate and articulate environmental and social sustainability into their strategic plan and business strategies. This thus also further points to the importance of supply chain partnership towards obtaining an improved environmental sustainability performance, as further suggested in Oo and Lim's (2010) [29] survey of Singaporean contractors.

Turning to organizational technological capabilities (TC), Table 3 shows that TC has a positive effect on (ESP) with the β and f^2 values of 0.141 and f^2 = 0.252, respectively. The result tends to agree with the findings of and Thrope et al. (2009) [59] that the use of technology could improve efficiency and productivity; hence obtaining improved environmental sustainability performance. To this, the correlation analysis findings revealed that organizations that use innovative methods (TC1) are more likely to have better control over water wastage (ESP4) and greenhouse gas emissions (ESP10). Interestingly, some respondents did acknowledge the importance of technological capabilities on sustainability improvement and the pace of technological advancement, by stating that:

> "We like to say we are just behind the cutting edge of current technology . . . ". [Respondent 09]

> "The technological capabilities are something we are trying to establish as it makes performance reporting more efficient". [Respondent R18]

Lastly, the results in Table 3 show that construction organizations' environmental sustainability performance could also be positively included by their organizational culture (OC) with a path coefficient β of 0.205 f^2 = 0.205. In this research, it could be seen in Table 2 that OC is significantly characterized by informed employees (OC1); (ii)an atmosphere of trust and respect (OC2); (iii) employees' participation in decision-making (OC3); (iv) organizational support in achieving individual goals (OC4) (v) sustainability being a priority of top leadership (OC7) (vi) employees being trained (OC5). It is notable that by promoting continuous employee training and developing a learning-oriented culture (OC5), organizations are more likely to assess and manage the environmental impacts of their activities (ESP1), make better decisions in terms of the use of renewable energy (ESP2) and biodiversity (ESP#) This tends to add weight to Linnenluecke's [11] conclusion that if an organization's culture encourages employee participation and incorporates sustainability across all organizational levels, the organization is more likely to achieve its targeted environmental sustainability. In supporting this, one of the respondents commented:

> "We pride ourselves on respectful relationships at all levels of the business and maintaining our strong reputation for fair dealing. We attract and retain high-caliber employees who share this culture. This allows us to be consistent and confident in the way we deliver projects". [Respondents R09]

Furthermore, this study found that an organization's culture has a greater indirect impact (β = 0.538 significant at $p < 0.05$) than a direct impact on its environmental sustainability performance (β = 0.205significant at $p < 0.05$). Although employees' skills and attitude (ESA) does not have a direct impact, the findings show that they will indirectly affect their organizations' environmental sustainability performance (ESP) with a β of 0.463 (significant at $p < 0.05$). This phenomenon could partially be explained by the triangular relationship between employees' skills and attitudes (ESA), technological capabilities (TC), and environmental sustainability performance (ESP). Thus, if employees are trained with lasting technology and have a positive mindset toward sustainability the environmental sustainability performance is likely to be improved.

6.2. Drivers of Social Sustainability Performance (SSP)

It can be seen in Table 3 that five factors have collectively explained 68.2% of the variance of social sustainability performance ((SSP), significant at $p < 0.05$.). Of these five organizational factors, only two were found to be a significant driver of SSP. For this, organizations' culture (OC) was found to have a significant positive impact (β = 0.589, f^2 = 0.206) on their social sustainability performance (SSP). This result tends to support the assertion of Linnenluecke and Griffiths [11] and Hamadamin et al. [65] that the implementation of a corporate sustainability strategy is dependent on a change in the culture rather than simply adopting the sustainability measures and publishing annual reports.

Adding to the above, organizations' business strategies (BS) were found to have a significant positive impact on their social sustainability performance, with the correspondingβ and f^2 values of 0.504 and 16, significant at $p < 0.05$. This finding tends to support Jones et al.'s (2006) [8] argument that for successful implementation of any sustainability initiative, management must be committed to creating a business case for social sustainability and allocated resources and capabilities towards implementing those strategies.

7. Conclusions

This research aimed to investigate the organizational factors impacting the sustainability performance of construction organizations. One of the most salient findings from this research is that organizational culture (OC), business strategies (BS), and technological capabilities (TC) are the significant drivers of construction organizations' environmental and social sustainability performance. To improve these two aspects of sustainability performance, the results attest to the importance of (i) forming a collaborative partnership with clients and subcontractors; (ii) creating the business case for sustainability; developing a learning-oriented culture that promotes continuous professional development and training for employees. Of this, we found that organizational learning culture is the key foundation for strategizing and implementing initiatives for improved sustainable performance. As researchers argue (e.g., [47,72,74]) organizational culture provides the basis for organizations and their employees to embrace a certain type of belief, and in turn encourage them to take up the desired form of intention and engage in certain behaviors to facilitate the achievement of their organizational sustainability goals. To create a learning-oriented culture, our findings attest to the importance for management to (i) foster trust and respect, and no-blame attitudes among employees; (ii) promote employees' participation in decision making; (iii) prioritize sustainability as one of the top company's goals; and (vi) invest into continuous employee training and development. Through the successful induction of these beliefs and processes, management would be very likely to gain the buy-in and commitment of their employees, changing their attitudes and improving their skillsets and knowledge, helping improve their organizational technical capabilities, and implementing and managing different initiatives to meet the targeted sustainability goals. Further to this, our study found that organizational technological capabilities are significantly characterized by building an efficient system to communicate and share real-time information with employees, monitor sustainability performance, and reduce material use.

From the theoretical lens, this research contributes to the body of knowledge in construction management by developing and testing a theoretical framework of organizational sustainability performance based on the resource-based theory and triple-bottom-line notion. This could be the first known quantitative study in construction management research that investigates the collective effect of key organizational resources and capabilities on the three dimensions of organizational sustainability.

However, it is acknowledged that the findings of this research should be interpreted within the limitations of this study, which is exploratory in nature, and that the findings are indicative rather than conclusive in nature. For example, the small sample size of this research does not allow the generalization of findings. However, with the use of PLS-SEM, competent analyses were conducted towards offering some meaningful findings which shed light on how to improve the different dimension of sustainability performance. Despite different measures taken to eliminate any potential basis, it is noted that the data collected could still be subject to informant bias and self-reporting errors due to the adoption of the key informant approach. Lastly, this research only focused on the direct impact of five key factors on organizational sustainability performance. It does not consider other possible factors such as company ownership, age, organizational structure, external business environment, etc. As such, future studies could explore all these factors as well as the inter-relationship of all these and identify factors on organizational sustainability performance.

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