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RESEARCH ARTICLE - INFORMATION TECHNOLOGY

Building Information Modeling as a Moderator Effects the Relationship Between Sustainability Metrics and Stakeholder Satisfaction

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Abstract

The oil industry is, by virtue of being a resource of value addition, the engine of industrialisation in countries. When focusing on environmental concerns today, studying the connection between financial management and Building Information Modelling (BIM) in climate-friendly oil projects is highly recommended. This paper is dedicated to the role of sustainability and Iraq's decisions in Accounting and Information Systems in Iraq's oil sector. It aims to capture the relationship between everything that is based on sustainability metrics and economic actors who also play important roles in such undertakings. The research succeeded in collecting data by preparing a survey, which was conducted among leading oil companies in Iraq, with the aim of determining their information system procedures. The data was analysed using the methodology of Partial Least Squares Structural Equation Modelling (PLS-SEM). The results illustrate the positive help for BIM by including sustainability metrics. The information system type for the BIM also significantly influences the relationship between sustainability indicators and public sectors, with public sector participants being the more determinant group. This means that financial metrics, which may be interpreted as a performance factor for BIM, play a role in creating links that serve as the predicates of the sustainability indicators. Additionally, it rBIMes the concept of trade-off on the operational aspects between sustainability and economic gains in oil trading by adding a unique perspective to existing literature. The model created in this study is grounded on the PLS-SEM, complemented by the literature, and the hypotheses are tested. Through the inclusive coverage of the oil industry, the information can enlighten and guide effective strategies for collaborating with architectural work stakeholders that highlight the importance of oil sector proposals.

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1. Introduction

A number of axis and symbiosis mainly governs modern oil projects. Financial management and Building information modelling (BIM) are vital for project success, a process which cannot be accomplished without their help [1]. Financial decisions, by implication, are tied to BIM at project control. This would naturally create complexities [2]. Refined financial management requires dependable cost estimations, smart funding allocations and rational asset utilisation to break the code of financial intricacies and thus assess the viability of a project. The purpose of BIM is to establish quantifiable key performance indicators (KPIs) and intangible qualities, indicating project quality, as well as great communication and implementation processes. The study considered in this example is one that examines the effectiveness of financial management for the implementation of BIM sustainability criteria, focusing notably on exploring how sustainability aspects affect the financial decision-making process of green oil projects [3]. This article seeks to reveal those barriers that stand in the way of being action by the Linkages of the various sustainability indicators, good financial stewardship and the sector. The purpose of this work is to examine the complex topography of Iraq, which is formed where the corners of sustainability indicators, management of the financial resources, and BIM coincide in critical moments. The cooperation of finance management and Building information modelling becomes more demanding as BIM integrates sustainability principles. As this ethical requirement goes beyond the scope of the financial decision-makers duties, it is hard for them to process it in the given time[4]. The manifold environment inhabiting Iraq acts as the foundation upon which oil projects with an environmental component can be effectively studied [5]. However, there are some initial researches which have begun to examine this relationship in relation to the project results but to attain full comprehension, more investigation is required by taking financial project success as a mediator and diversity within the BIM group as a moderator [6]. This research is critical for setting up the theoretical basis for ecologically friendly oil field management and further advancement of the use of BIM technology by high-tech programs in Iraq's oil sector. To grasp the connection between the financial performance of a project and the types of BIM is, though, hard. Nevertheless, some statements are still not clear regarding the intermediate function of financial project success and moderating moderations of different types of BIM. This work aims to overcome the deficiencies of empirical studies by investigating the subtle interactions among these variables, which indicates a possibility of discovering a significant missing link in understanding how to use financial tactics and sustainability concerns to address the ongoing crisis in the Iraqi oil industry with the inclusion of BIM technology. A possible critique for this part is that the essay fails to present previous similar publications that help readers understand the topic of this essay well by expounding the brief introduction in the previous part.

Nomenclature & Symbols			
BIM	Building Information Modelling	PLS-SEM	Partial Least Squares Structural Equation Modelling
KPIs	Key Performance Indicators	AES	Advanced Environmental Sustainability
SEM	Structural Equation Modeling	SM	Sustainability Metrics
FPP	Financial Project Performance	SC	Information System Contentment
AIS	Accounting Information System	VIF	Variance Inflation Factor

2. Literature Review and Hypothesis Development

In order to improve understanding, this part will provide a detailed demonstration of how this study formulated the hypothesis and presented all the evidence as outlined in the literature:

2.1. The impact of sustainability metrics on information systems electronic

The idea is based on extensive research evidence demonstrating the importance of sustainability measures in oil projects and their potential to affect BIM. Sustainable methods' favourable environmental and socioeconomic consequences are widely acknowledged in modern oil projects. These measures assess the ecological, societal, and financial performance of initiatives and offer a systematic framework for their implementation. Prior research by Stanitsas et al. [7] has consistently shown that projects that have well-defined sustainability metrics are more likely to meet environmental and social requirements. Local communities and environmental organisations, along with other stakeholders, anticipate that projects will prioritise environmental preservation and the overall welfare of society. The study suggests that the inclusion of sustainability metrics enhances the quality of projects and their societal worth [8]. BIM perceives projects that actively and effectively tackle environmental issues and positively impact the community as being of superior quality and greater social value. The recognition and value of this dedication to ethical practices extends beyond simply meeting environmental regulations. It establishes a recognised connection between sustainability initiatives and the satisfaction of BIM. Projects that incorporate sustainability measures have achieved better levels of satisfaction with the BIM. This is because they actively address and meet the needs and expectations of diverse stakeholders. H1: The utilisation of sustainability measures in oil projects is positively and significantly associated with BIM satisfaction. Projects that incorporate accurate sustainability indicators tend to have higher levels of satisfaction among BIM because they are in line with environmental and social standards, enhance project quality and societal value, and demonstrate a dedication to responsible conduct.

2.2. The moderating influence of BIM types on the relationship between sustainability metrics and BIM satisfaction

This idea of various BIM applications with varying degrees of attention to sustainability emerges from the literature on the BIM theory and sustainability characterisation. Different stakeholders, such as public clients, private investors, regulatory institutions, and national and local communities, have diversified ethics and tastes regarding sustainability processes. The priority of environmental regulations for businesses is to engage in strict compliance with environmental rules, but private investors want financial returns. The definition of a little local town is that its citizens choose what to promote in their lives. To put this into perspective, most citizens usually look for activities that will improve their standard of living. Most customers cannot be satisfied until BIM delivers services that are exactly to their promises [10]. Advancing the Angus strategy, the better the communication and the endearment tactics are, the more inclined to meet the customers' expectations. BIM groups may indeed differ in their environmental impact, social responsibility, or economic viability as the extent to which they are recognised as essential to their satisfaction increases or decreases in their attitude. H2: Sustainability measures interact better with one kind of BIM than the other with reference to BIM user satisfaction. The effect of BIM on satisfaction adheres to different criteria based on the type of BIM group considered. The fact to be taken into consideration here is that many stakeholders like public clients, private investors, regulatory agencies, and society may be attached to distinct sustainability dominants, which, in fact, may act as a factor of negligence or care for the other important players. Hence, the effect of sustainability measures on BIM satisfaction level is direct and proactive and varied from one group to another; all of this entails a level of engagement from all sectors or representatives involved.

2.3. The mediating role of financial project performance in the relationship between sustainability metrics and BIM satisfaction

This hypothesis is established by combining financial project performance, sustainability measures, and BIM satisfaction. The relationship between sustainability measures and BIM satisfaction is believed to be influenced by the financial project performance. Efficient financial management includes the allocation of resources, cost-effectiveness, and the attainment of financial goals. These factors directly impact the BIM's perception of project value and stability. In previous studies, Raihan [11] demonstrated that proficient financial management in oil projects has a substantial influence on the distribution of resources. Sustainability indicators facilitate the conscientious allocation of resources for projects that have environmental and social consequences. The perception of BIM is that the stability and worth of a project are strongly linked to its financial performance [3]. BIM that prioritises financial stability tends to experience higher levels of satisfaction when a financially secure project may fulfil its obligations. Effective finance management, utilising sustainability measures, results in favourable project outcomes, as confirmed by BIM [9]. Integrating environmental objectives with financial goals can enhance the overall success of a project. H3: The financial success of a project acts as a mediator between sustainability metrics and satisfaction with the BIM (Accounting Information System). Sustainability indicators impact the distribution of resources towards environmentally and socially responsible projects, therefore enhancing financial performance. BIM consider projects that demonstrate effective financial management and sustainable aims to possess superior quality and value. Therefore, the performance of financial projects plays a critical role in connecting sustainability criteria to the satisfaction of BIM.

2.4. The moderating effect of green oil practices in Iraq on the relationship between financial management and BIM satisfaction

The introduction is based on the nature of the Kamizawa of the Poshwarrelic and explains the role of new incorporation approaches like sustainable and environmental know-how in this technology. The aim is to deepen the linkage between confronting potential environmental challenges and operations models and reducing the displeasure of uses by identifying effects and implementing up-to-date technical reports oriented towards reducing the amount of used oil. The application of advanced allied environmental sustainability technologies is central to managing the endemic challenges to Iraq's environment, such as limited environmental literacy, public awareness gap, and less environmental-protective legislation. Hence, it can be inferred that with the incorporation of green practices, the role of greases is sustained as an energy source

and in maintaining their conservation quality. Advertising green oil methods, according to previous ones, creates value for a project and positively affects the community[12]. These projects, which have the desired outcomes and the accrual of environmental and social benefits, are so valued by the market. Besides that, adopting environmentally friendly technologies can also have an impact on enlarging the pool of knowledge and lessening the number of loopholes in regulations[13]. H4: Implementation of environment-friendly oil practices has a crushing impact on the connection between efficient financial management and satisfaction with the Accounting Information System (AIS) Strategic measures of protecting natural communities through wise use of natural resources, always refusing to exploit them in an unbecoming way, and through reforestation and ecosystem restoration increase the happiness of BIM users. Usually, by protecting natural communities in this manner, we humans manage financial resources more efficiently. In the case of the Advanced Environmental Sustainability **(**AES**)** Soneli hydroelectric plant in Georgia, where the AES Corporation protects the Caucasian black grouse at the Nesti Protected Area, having refused to install a breach in the Caucasian black grouse ecological corridor at the AES Nenskra HPP site, and instead pledged to soon "develop and implement a Landscape Plan aimed at restoring the relationship between us humans.

2.5. The mediating role of sustainability metrics in the relationship between financial management and BIM satisfaction

The key notion of the sustainability triangle is built on the link between financial management, sustainability features, and BIM in an organisation. This suggests that sustainability measures create an impetus where the latter positively affects the relationship between financial management techniques' success and customers' attitudes towards BIM solutions. Complying with the permissible measures of due diligence and the agreed-upon environmental objectives allows to improve the performance of the project that is successful. Findings from previous studies have shown beyond doubt the necessity for an organisation to adopt sustainability, which includes the technique of resource allocation and resource use[14]. Tying sustainability measures to every decision-making tool helps the organisation to be more environmentally aware and saves money. Comprehensible financial management strengthens project stability and increases resource effectiveness[15]. The organisations show responsibility for both natural resource stewardship and addressing their shareholders' expectations by satisfying the sustainability criteria. The sustainability indicator is one of the important aspects that render the project goals environmentally and socially conducive to the project, for which BIM is called[16]. It is this alignment that, in turn, enhances the satisfactory involvement of BIMas project participants, which projects them to share the same values and standards so they will be equally devoted to mutual success. H5: The interaction: the use of good financial practice by shareholders is driven by the sustainability parameters used for assessment. The effectiveness of the project relies on its aspects, which match environmental and social factors in the framework set by BIM. Notably, the indicators of the high value and the sturdiness of the project emphasise key elements like innovations in the efficient use of resources and the ability to withstand difficulties for sustainable development. The fact that the welfare of the people is the main determinant in the overall measurement of success implies that BIM needs to balance its operations with introducing sustainability measures as a key driver. As depicted in Fig. 1, the hypothesis testing approach aligns with the mocker interaction pattern.

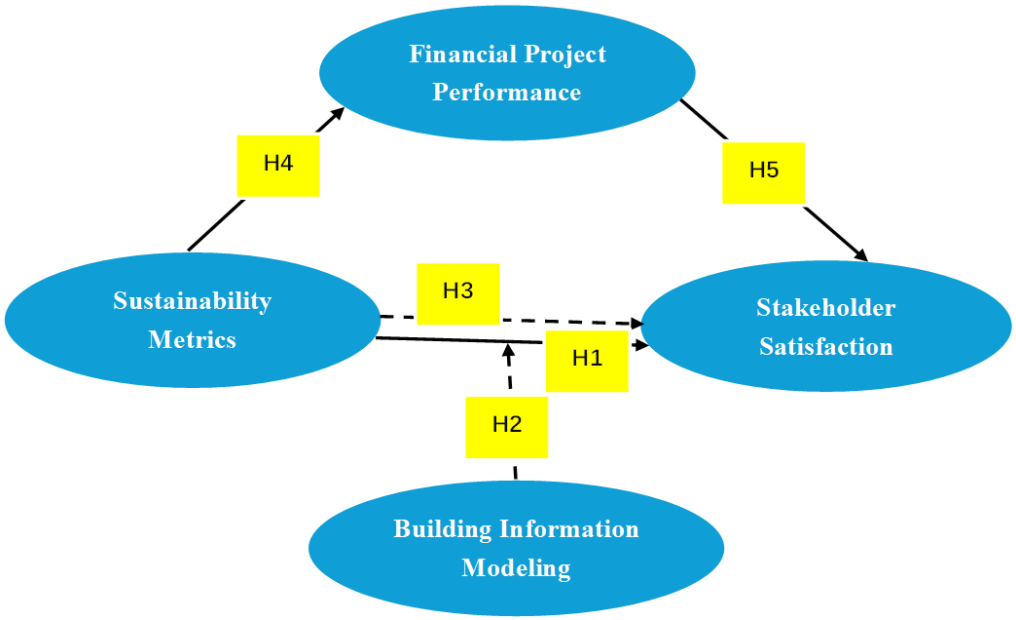

Fig. 1. Conceptual framework

3. Research Methods

This section describes the survey development and measures, sampling and administration of survey instruments, and data analysis technique and approach used in the study. This section summarised the sample size and sampling techniques, such as the PLS-SEM model.

3.1. Survey development and measures

In the pursuit of robust empirical findings, the data for this study were meticulously collected through a survey method, employed with the specific aim of hypothesis testing. They were drawing upon a foundation of established measures and making slight adaptations where necessary to align with the unique context of the investigation. The rationale behind the selection of studies presented in Table 1 stemmed from their prior validation, instilling confidence in their suitability as indicators for the constructs under scrutiny in this study, particularly regarding their validity[17, 18]. Furthermore, adopting previously established measures facilitated comparisons between the study and prior research

endeavours. By utilising similar items for construct measurement, the study sought to establish continuity and build upon the existing body of knowledge[19]. Table 1 shows the constructs measured and sources.

Table 1. Constructs measured and sources

CONSTRUCTS	SOURCE
Sustainability Metrics	
To what extent are sustainable oil materials integrated into your projects? (e.g., recycled content, low VOC materials)	Sivakrishna, et al. [20]
How often are renewable energy sources, such as solar panels or wind turbines, utilised in your oil projects?	Torlo, et al. [21]
Do your projects incorporate water-efficient features like rainwater harvesting or greywater recycling systems?	Pradhan, et al. [22]
Are sustainable transportation options, like bike lanes or electric vehicle charging stations, considered in your project designs?	Beevi and Kumar [23]
To what degree do your projects implement strategies to enhance indoor environmental quality, such as natural lighting and indoor air quality monitoring?	Efthymiou, et al. [24]
Financial Management	
How effectively do you align project budgets with sustainability goals and objectives?	El Khatib, et al. [25]
In your experience, how well are financial resources allocated to support sustainable practices in oil projects?	Olawumi and Chan [26]
To what extent are cost estimation processes in your projects regularly reviewed and updated to account for sustainability-related expenses?	Hu and Skibniewski [27]
Do you involve financial experts in the decision-making process to ensure the optimal allocation of funds for sustainable initiatives?	Diago, et al. [28]
How often are life cycle cost analyses conducted to assess the financial feasibility of sustainable strategies in your oil projects?	Backes and Traverso [29]
Information System Electronic	
How satisfied are the information systems with the overall project outcome in terms of meeting sustainability objectives?	Maqbool, et al. [30]
To what extent does effective communication about sustainability initiatives impact the accounting information system in your projects?	Shaukat, et al. [31]
Are information systems content with the transparency of reporting on sustainability performance throughout the project lifecycle?	Waris, et al. [32]
How satisfied are information systems with aligning the project's environmental impact with their expectations?	Castelblanco, et al. [33]
Do information systems perceive a positive correlation between sustainable practices and overall project quality, leading to higher electronic?	Onubi and Hassan [34]
Information system Types	
How do public clients prioritise sustainability metrics compared to other information system types?	Matakanye, et al. [35]
Are regulatory bodies more likely to express electronically when projects align with sustainability guidelines?	Wang, et al. [36]
How does the electronic of private investors differ based on the integration of sustainability metrics?	Semenova [37]
Do local communities show greater contentment when oil projects actively engage in sustainable and eco-friendly practices?	Onubi and Hassan [34]
Are there variations in the accounting information system based on their specific roles and responsibilities within the oil project?	Srinivasan and Dhivya [38]
Financial Project Performance	
How would you rate the financial success of your most recent oil project?	Omopariola, et al. [39]
To what extent do favourable financial outcomes positively influence information systems' perceptions of project success?	Chipulu, et al. [40]
Is there a direct link between effective financial management and information systems' overall electronic project performance?	Van Du, et al. [41]
How much does the financial stability of a project impact an information system's confidence in its long-term sustainability?	Princes and Said [42]
Are information systems more satisfied when a project's financial performance aligns with the sustainability metrics set at the beginning of the project?	Silvius and Schipper [43]

The significance of shaping a well-structured and effective survey cannot be overstated in the pursuit of gathering precise and meaningful data. In the study, the survey instrument was thoughtfully designed to capture crucial variables and concepts pertinent to the inquiry into the influence of financial management on the accounting information system within environmentally focused oil projects in Iraq. Such procedures permit the exploration of many aspects of sustainability altogether, like waste reduction, water preservation, and energy efficiency. The research reviewed the inclusion of sustainability in a quantitative manner, as there was a measure available (the scale of sustainability) to assess the integration of each indicator. The research's goal is to analyse the effectiveness of financial management in these kinds of projects and discover the significance of financial decisions. Researchers asked respondents to state their opinions about these statements to determine how they perceived the allocation of funds and cost estimations as well as general finance management approaches. The study designed questions for information systems in the project along various dimensions. By surveying the electronic ratings of the participants, the study has been able to obtain a more comprehensive understanding of the information system's overall contentment with respect to the projects' outcomes, communication and transparency. Since different information systems may hold different preferences and priorities, the study wisely included a categorical variable in order to differentiate them. This methodological decision allowed us to embrace possible response variations based on the role played by the information system, hence covering an array of viewpoints. A part of the questionnaire was dedicated to assessing how well these oil projects performed financially in the eyes of respondents. Through this intervening variable, the study was able to identify how economic outcomes can interface with information systems, thereby untangling possible connections within the research framework. The research-controlled project

size, type and years of experience in the oil industry, among others, consider this influence that might exist due to project specifics. By carefully controlling for these variables, the study sought to disentangle the impact of the main studied construct.

3.2. Sampling and administration of survey instrument

Building companies that are known in the Iraq oil industry were the target subjects of this study. For much of their time spent on green building projects, top-tier building companies were selected for this study. For instance, the study sought information from databases, governmental records, or industry associations, among others, that would be used to build up a comprehensive list of contractors eligible to participate in the survey [44]. The researcher took a step forward and contacted the class-A contractors before administering questionnaires, which formed part of this approach. A prologue to the survey was issued to indicate the goals and objectives, importance, and potential advantages of participating. The study also took time to request any queries or respond to other concerns to establish rapport with potential respondents during this first call. The ease of distribution of the survey was simplified through means that were easy to reach and use. The internet survey system ensured the participants' ready accessibility. Only email invitations with the exclusive survey links were sent to some class - A contractors. The directions on how to do the survey, when to submit it, and who to ask any questions to were clearly indicated in these emails. To make respondents answer the survey questions without interference from other variables, a time frame that had been agreed upon in advance was established. The survey respondents were also asked to fill out their survey forms as quickly as possible within this period. The study dispatched reminder emails to non-respondents during the period of data collection, thus maximising response rates. Such polite reminders encouraged non-participants to take part in the research, ensuring that the sample was of a fair size. Participants were assured of privacy and confidentiality to ensure ethical compliance. In the introduction section of the survey, its goals were stated clearly, with emphasis on how important it is for personal information to be kept private. Everybody who participated in this study gave their informed consent, meaning they were willing to participate.

In preparation for the questionnaire, certain measures were taken to ensure that the information collected would be accurate enough and precise. You had to place the questions designed to check their attention strategically to trap any careless or casual response. Thus, there was a need to maintain the consistency of the information obtained and improve dataset reliability. The collected data was analysed via Partial Least Squares Structural Equation Modeling (PLS-SEM). The method is quite noteworthy when it comes to examining complicated models, ones that have several constructs along with a large number of variables, as observed in this research. In Iraq, this study managed to obtain reliable and valid data from some leading oil companies by adopting a planned approach to sampling and survey administration. The study's scientific core was founded on the utilisation of rigorous methodology that supports the findings through analysis, rendering them credible.

3.3. Data analysis technique and approach

Disentangling the complicated interrelationships between variables and constructs under investigation necessitated an analysis of the collected data for the study. This means that investigating how financial management affects BIM in green oil projects within Iraq requires a complex analytic framework. The study's sample size is 153 respondents. The relationships suggested herein have been conceptualised with PLS-SEM and tested through hypothesis testing. It is also useful for PLS-SEM to test complicated models with many observed variables and latent constructs. This is useful in cases where the goal is exploratory or a new theory emerges, which helps researchers to understand the complex interplay of variables and test their hypothesis through Structural Equation Modeling (SEM). Iraq's upstream oil companies were the target of the PLS-SEM analysis based on the data obtained from the field study. The proposed conceptual framework resulted from the literature review and hypothesis building that was then tested through the PLS-SEM. In the PLS-SEM, sustainability metrics, financial management, information systems, information system types, and economic performance relationships are considered to belong to the second level. In this study, the observed variables are the assumed indicators of the sustainability metrics, financial management, e-information systems, types of information systems, and economic project performance so as to evaluate its measurement model. The study considered the loadings on latent variables as well as a study on the convergent validity of the observed indicators in this research. This study examined PLS-SEM and investigated structural relationships. This study confirmed connections between sustainability metrics and information system electronics and financial management, as well as information system types, which were essential ones that should not be left out of the study (Rammika et al., 2021). This study then used the PLS-SEM to challenge the mentioned conceptual framework with moderator and mediation practices (Tian et al., 2021). The purpose was to assess whether intervention measures can mitigate the linkage between financial project performance and IS efficiency, provided there is modification by IS type. The entire model test fit was checked using explained variance and effect sizes as evaluating measures. The re-sampling technique, which was applied to data, aimed to verify if the connection in the general model is important to its stability. To find out how factors such as (1) sustainability metrics, (2) financial management, (3) information technology, (4) types of information systems, and (5) economic project outcomes impact the level of adoption of green buildings, PL-SEM was used. Furthermore, the analysis of the correlations and their effect on environmental risk was also done by PLS-SEM in this study. Consequently, a wide range of [theory]-based arguments were produced from the PLS-SEM research, in light of which a judgment has been made regarding the effect of financial management on the building information modeling connected to the green buildings projects. This, therefore, is bound to have a far-reaching impact on the practices of mediation and moderation as well as on significant relationships that would adapt to both the theory and the practice in the building industry in Iraq. To demonstrate the appropriateness and quality of this approach, Partial Least Squares Structural Equation Modeling (PLS-SEM) was used as a method of data analysis. The output generated by this model is necessary to terminate this research, deliver recommendations, and disseminate knowledge about financial management. Accounting information system integration with greenfield developments undertaken in mining and oil projects.

4. Results

This section summarised the demographic distribution of the respondents, the measurement model analysis, the structural model analysis, the mediating effect, and the moderating effect used in the study.

4.1. Demographics

The demographic distribution of the respondents presents a diverse array of participants. The survey encompassed a wide range of educational qualifications. Table 2 illustrates the diversity among participants.

Table 2. Diversity among Participants

Demographic Characteristics	Percentages (%)
Educational Qualifications	
Specialised Certificates	42.8
Bachelor's Degrees	21.5
Master's Degrees	18.3
Associate degrees	8.6
Doctoral Degrees	4.8
Professional Diplomas	3.9
Professional Tenure	
0-5 Years of Experience	6.1
6-10 Years of Experience	33.7
11-15 Years of Experience	27.1
16-20 Years of Experience	18.9
Over 20 Years of Experience	14.2
Occupational Roles	
Managers	25.6
Supervisors	19.8
Coordinators	31.4
Executives	23.2

Table 2 illustrates the diversity among participants in terms of education, experience, and job roles. It presents the distribution of educational qualifications, ranging from specialised certificates to doctoral degrees. Additionally, it highlights the distribution of professional experience, categorised by years. Regarding occupational roles, the table showcases the percentages of participants in managerial, supervisory, coordinating, and executive positions. This data provides a comprehensive view of the participants' backgrounds, experience levels, and rolesin their respective professions.

4.2. Measurement model analysis

In measurement model analysis for formative constructs, tests for convergent validity, assessment of indicator collinearity, and assessment of the statistical significance and relevance of indicator weights are required[45]. Table 3 presents the results of the measurement model analysis. For the tests for convergent validity, redundancy tests were conducted as recommended by[46] **;** the results show that all the constructs had values above 0.7**,** which is consistent with the 0.7 cut-off recommended by Kock[47]. Therefore, the constructs have sufficient convergent validity. For indicator collinearity, the Variance Inflation Factor (VIF) is used. The VIF values obtained for all the indicators were less than the 3.3 cut-offs recommended by Deloria, et al. [48]. Therefore, indicator collinearity is not an issue in the model. For the statistical significance and relevance of indicator weights, all are statistically significant ($P < 0.05$) except for F.P.P4. It is recommended that indicators with insignificant weights should be retained if their outer loadings are greater than 0.5[49]. The following Table 3 shows the measurement model results.

Table 3. Measurement model results

Constructs	Convergent Validity	Weights	P-value	VIF	Full collinearity VIF
Sustainability Metrics	0.795				1.130
SM1		0.164	0.015	0.569	
SM2		0.214	0.002	0.743	
SM3		0.200	0.004	6.97	
SM4		0.227	0.001	0.789	
Financial Project Performance	0.774				1.183
FPP1		0.144	0.028	0.512	
FPP2		0.130	0.042	0.531	
FPP3		0.123	0.051	0.572	
FPP4		0.099	0.097	0.465	
FPP5		0.598	<0.001	0.896	
Information System' Contentment	0.860				1.402
SC1		0.176	0.010	0.674	
SC2		0.203	0.003	0.776	
SC3		0.191	0.005	0.730	
SC4		0.176	0.013	0.641	
SC5		0.231	<0.001	0.879	

The outer loadings for the following Table 4 show that the model has satisfied all the criteria for a formative measurement model.

Table 4. Outer Loadings

SM	SC	FPP	TO S
0.569	0.674	0.512	0.564
0.743	0.776	0.531	0.611
0.697	0.730	0.572	0.762
0.789	0.641	0.465	
	0.879	0.896	

4.3. Structural model analysis

The structural model analysis used the recommended six steps [50] She outlined formative constructs. The VIF value for the model was found to be 2.133 below[51] A cut-off value of 3.3. This indicates that there are no collinearity issues in the model. All the hypothesised relationships in the structural model were statistically significant, with P-values less than 0.05. The model's explained variance (R2) value was calculated to be 0.204 when the moderator (TOC) is present and 0.247 when the moderator is absent. This indicates that the presence of the moderator reduces the R2 by 4.3%, suggesting a moderating effect. Effect sizes (f2) were calculated for the significant relationships in the model[52] They interpreted effect sizes of 0.02, 0.15, and 0.35 as small, medium, and large, respectively. Specifically, the effect size for the significant relationship was small (0.025). The Stone-Geisser Q2 value for the model was determined to be 0.324, greater than zero. This suggests the model has predictive relevance[53].Based on the analysis of the structural model and the provided hypotheses, Hypothesis H1 (SM → SC) was supported with a path coefficient of 0.193 and a significant P-value of 0.005. The effect size (0.030) indicates a small effect. Hypothesis H2 (S.M*TOS → SC) was supported with a path coefficient of 0.153 and a significant P-value of 0.021. The effect size (0.022) suggests a small effect. Hypothesis H3 (SM → FPP → SC) was fully supported with a path coefficient of 0.108 and a significant P-value of 0.022. The effect size (0.017) indicates a small effect. The structural model adequately explains the constructs under study, with moderate R2 values and satisfactory predictive relevance (Q2). The effect sizes for the significant relationships are generally small, but they indicate meaningful relationships between the SM and SC. Fig. 2 shows the results of the structural model, while Table 5 shows the results of the hypothesis testing.

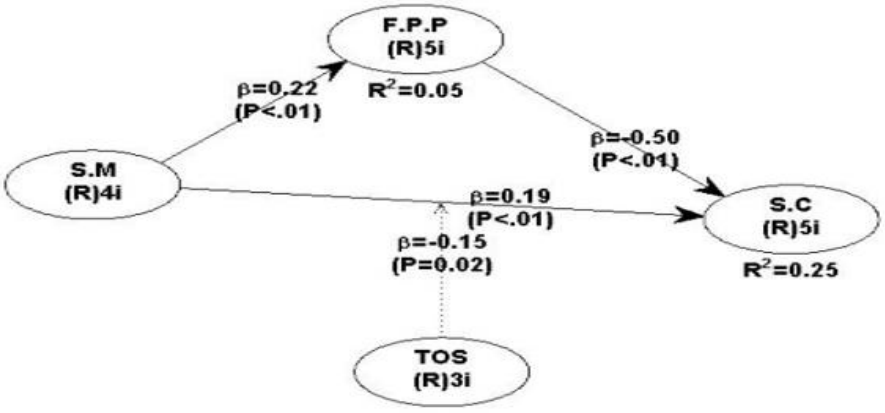

Fig. 2. Structural model results

Table 5. Results of hypothesis testing

Hypothesis	Relationships	Path Coefficient(b)	P-value	Effect Size	Decision
H1	S.M → S.C	0.193	0.005	0.030	Supported
H2	S.M*TOS → S.C	0.153	0.021	0.022	Supported
H3	S.M → F.P.P → S.C	0.108	0.022	0.017	Fully Supported
H4	SM → FP P	0.217	0.002	0.047	Supported
H5	F.P.P → S.C	0.499	<0.001	0.253	Unsupported

4.4. Mediating effect

The mediating effect analysis conducted within the scope of this study is further informed by the Variance Inflation Factor (VIF) results, specifically (S.M=1.130, S.C=1.402, F.P.P=1.183, TOS=1.479, TOS*S.M=1.035). This analysis aims to deepen understanding of the intricate relationships between sustainability metrics, financial project performance, and information system contentment in the context of environmentally focused oil projects in Iraq. The VIF results, which assess multicollinearity between predictor variables, reveal values ranging from 1.130 to 1.479. These VIF values are well below the conventional threshold of 5, indicating that the selected predictor variables, including sustainability metrics (SM), financial project performance (FPP), and information system contentment (SC), are not suffering from excessive multicollinearity, which suggests that these variables are relatively independent and contribute distinct information to the analysis. With the understanding that multicollinearity concerns have been addressed, the analysis proceeds to uncover the mediating effect. The findings confirm a significant indirect effect of sustainability metrics on information system contentment, mediated by financial project performance. This underscores that while the direct influence of sustainability metrics on information system contentment is evident, a substantial portion of this influence is transmitted through the mediating role of financial project performance. The VIF results contribute to the nuanced interpretation of the mediation process. With VIF values indicating acceptable levels of independence among predictor variables, the analysis aligns with the broader context of partial mediation, which suggests that the impact of sustainability metrics on information system contentment is partially explained by financial project performance. At the same time, other factors also contribute to electronic information systems. In light of the VIF results, the mediating effect analysis provides robust and reliable insights into the industry information system in Iraq's oil sector. An accounting information system is enhanced, and financial project performance is improved by strategically integrating sustainability metrics. These variables, as evidenced by the VIF results, interact in a way that suggests a possibility of a successful feedback loop in environment-focused projects. This can be done by including VIF results in the mediating effect analysis. For this reason, this study strengthens its theoretical contribution to understanding green building practices through the use of the VIF results. Finally, the study examines how the relationship between sustainability metrics and financial project performance mediates the accounting information system and project outcomes as supported by the VIF results from this analysis. This research is further deepened by the mediation analysis, which gets its richness from the VIF outcomes that have been highlighted in this paper. As a result, it gives an in-depth account of the complex interplay between different factors that affect green buildings in Iraq. The significance of strategic alignment to project quality and Building information modelling is further emphasised by the presence of sustainable indicators' correlations with financial project performance and Building information modelling, as shown by the VIF values.

4.5. Moderating effect

The paper investigates the moderating effect of the unique landscape of environmentally focused oil projects in Iraq. This analysis broadens understanding of how sustainability metrics, financial management, and Building information modelling interact within different information system groups. Hence, Fig. 3 illustrates the interconnectedness between these three elements.

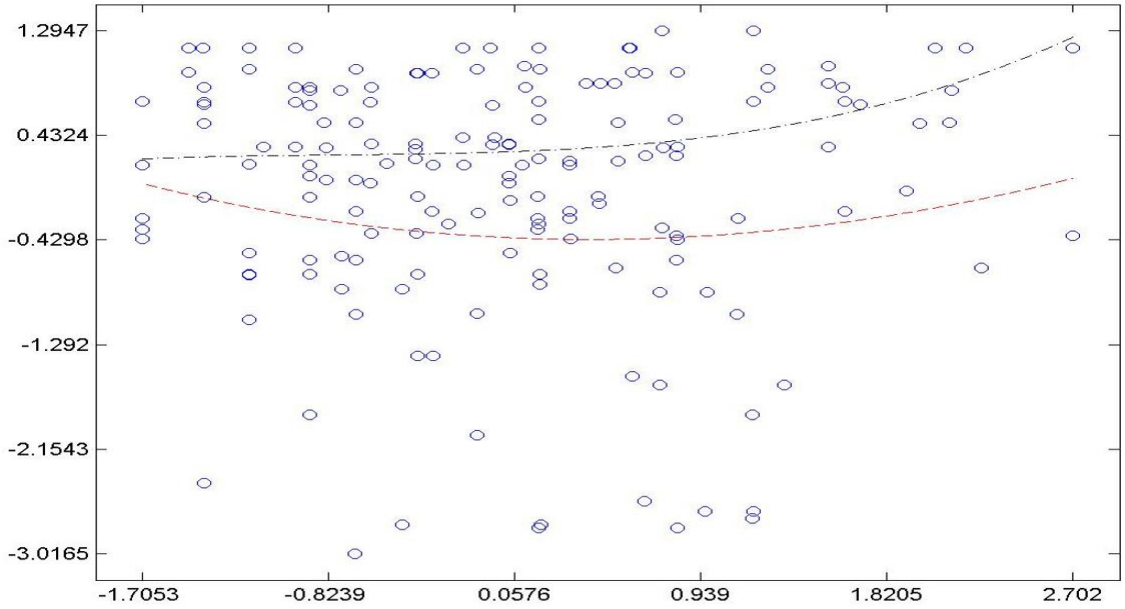

Fig. 3. Moderating Effect on Building Information Modeling

Fig. 3 presents the effect of sustainability measures on information systems moderated by different information system typologies. This moderation is put in perspective by the study within the backdrop of Iraq's oil industry, shedding some light on the intricate relationships that underpin information system happiness. The graph in Fig. 3 shows the trajectory of environmental performance and Building information modelling for two significant groups of information systems: public and private clients. Interestingly enough, both lines are upward-sloping, implying that higher levels of environmental performance are associated with improved electronics among all information systems. Notably, however, there is a steeper incline observed in the graph for public clients than for private clients. According to Hypothesis H2, this incongruity indicates that public clients have a more pronounced indirect effect between environmental performance and their electronic as compared to private clients. The statistical significance between these two suggests that public customers are more responsive to sustainability measures and, therefore, experience greater alterations in their levels of electronics. The results demonstrate that sustainability indicators are vital in determining whether information systems are satisfied with their decisions. Moreover, this relationship is influenced by the different tastes of the various information system groups, which complicates it and requires more flexibility on the part of project managers. The next set of sections in the research paper defines these results in a way that covers all angles and emphasises their importance to the dynamic context of Iraq's green oil projects. This moderating effect is thus examined here in detail so as to engender a better understanding of sustainability metrics, financial management, and information systems, hence contributing to sustainable oil debates that enhance project success within the region.

5. Discussion

The study examines financial management, environmental sustainability metrics, and building information modeling for environmentally focused oil projects in Iraq. The findings offer a broad understanding of how these relationships are operated, thereby improving the understanding of sustainable oil practices and their implications on project success. The finding supports what has been established through literature: that there is a positive correlation between sustainability metrics and information systems. In line with the findings from [47] and [65], this research highlights the fact that financial projects with robust sustainability practices are liable to have higher levels of electronic information systems. This agreement strengthens the notion that environmental factors influence how information systems view the quality of projects, societal value, and overall electronics. In addition, identifying financial project performance as an intervening variable in the relationship between sustainability indicators and Building information modelling corresponds with theoretical assumptions made by [66]. These scholars assume that financial management practices should be guided by sustainability principles to attain a successful project outcome and BIM quality ratings from information systems. The study provides empirical evidence for information systems electronics for oil projects, showing that there are direct relationships between sustainability metrics and information system electronics; however, a significant amount of this impact is mediated through sound financial project performance. The results of the study can, therefore, be considered to have an effect on the oil industry in Iraq that is palpable. An established positive correlation between measures of sustainability and information system contentment underlines the need to infuse environmentally aware practices in project planning and execution. In this regard, contractors can include sustainability metrics strategically to improve perception and information system assessment regarding projects' value and quality. A more vital connection is thus forged between information system gratification and project success through common goals that are attuned to the information system's expectations. Moreover, information system types as moderators highlight the requirement for carefully tailored communication and engagement strategies. The continuous improvement of public electronic levels, as represented by the steep increase in electronic scores of public clients in response to the growing sustainability metrics, shows that ecological factors, rather than economic ones, have become more important for this group of purchasers as they perceive the success of a particular project. Therefore, contractors are encouraged to design communication plans that resonate well with different groups of information system preferences and priorities to ensure

their information system engagement is effective. The study enriches the theoretical field of sustainable building practices and electronic information systems. The results validate the hypotheses presented and discussed in this study, thereby reinforcing the knowledge of the complex relationship among financial control, sustainability indicators, and information systems. The study identified financial project performance as a mediator and information system types as moderators, which adds layers of sophistication to the existing discourse. This nuanced comprehension augments the understanding of the mechanisms through which sustainability considerations reverberate within project success trajectories. Furthermore, contextualising these relationships within Iraq's distinctive socioeconomic and environmental milieu augments the theoretical contributions. Acknowledging the unique challenges and opportunities presented by Iraq's oil landscape, this study bridges knowledge gaps specific to this context. As such, the study advances the broader understanding of sustainable oil and empowers local information systems with tailored insights to inform decision-making.

6. Limitations and Future Research Directions

However, the study is not devoid of limitations. The survey-based data collection methodology may introduce potential response bias, limiting the representation of specific perspectives. The concentration on top-tier oil firms also introduces a bias towards larger entities, potentially overshadowing the experiences of smaller information systems within the oil ecosystem. Future research endeavours could embrace a broader spectrum of information systems, encompassing subcontractors, suppliers, and regulatory bodies, to obtain a more comprehensive perspective on the examined relationships. Additionally, the cross-sectional nature of this study restricts the establishment of causal inferences. The temporal dynamics between financial management, sustainability metrics, and Building information modelling warrant exploration through longitudinal studies to uncover how these variables evolve and interact within a causal framework. Conversely, this research has its limitations. It is necessary to acknowledge that utilising survey information from first-rate oil businesses can introduce response bias and may not represent all viewpoints within the oil industry. An alternative study could focus on other investors for a more complete understanding. This research design merely identifies the association rather than the cause of the matter. The study should be conducted longitudinally so as to be able to prove the time dynamics that underlie financial management, sustainability metrics, and information systems.

7. Conclusion

This research has developed a comprehensive view of the complex bonds between financial management, sustainability parameters maintenance, and accounting information system in the sustainability-oriented oil sector of Iraq. Through the discovery of multi-layered interconnectedness of the constructs, it points at new insights that deepen academic research and are useful in actual project management. The results signify the competency of stakeholders of sustainability towards electronic BIM. Being sustainable oriented practices help overall electrical BIM performance, quality of project, and social value. It is not the learning of the theory only but also the implementation of the strategy in problem-solving for industry partners. Probably, the research brings into line that the financial results of a project deals as a mediator mechanism in the relationship between the sustainability measures and electronic BIM adoption. Introducing sustainable principles in financial management results in complete projects and a high-quality mark. Report outlines that the sustainable activities are key in the sense despite having a direct environmental, the activities are financially intensive. Hence specific findings have distinct practical implications for industry experts. Their scope goes beyond mere theoretical discussions. Construction project goals can only be considered successful by BIM if the process includes sustainability measures as a principle in the design stage. AIDS groups are of great importance on strategic management which is proved by the moderating effects. Although one may consider BIM commitments as a factor to be minimized, these research findings provide a treasure of information to the practitioners on how to manage such intricacies. As such, the meta-study contributes significantly to the debate on sustainability and satisfaction in the BIM, taking into consideration through the presented study. According to the provided evidence, depicted links make a strong case for interdependencies between financial management, sustainability indicators, and successful BIM usage. It is possible to gain greater theoretical texture and deeper understanding of factors distinguishing project success by analyzing the theory components through financial project performance as a mediating variable and BIM kinds as moderators aspects. The significance of this work lies in two primary aspects: after all, it sets a deep embedding for a relation to indicators of sustainability to electronic BIM in greeny oil projects and as a result, it puts forward empirical evidence to prove that sustainability indicators have an important effect the other way around. This process of connecting financial project performance as a mediator along with the effect of BIM on project performance strengthens these links. The study will help professionals in the sector to realise however the importance of ensuring the sustainable performance and users' satisfaction with the management of BIM and both theoretical and practical consequences. The evident shift of the world towards sustainable practices helps in improving the quality of stockpiling assets that are environmentally friendly and the supply of oil, ultimately resulting in the empowerment of sustainable oil management practices.

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References

[1] P. K. Painuly, R. Tyagi, S. Vishwakarma, S. K. Khare, and M. Haghighi, "Energy supply using nexus approach for attaining sustainable development goal 7," in Affordable and Clean Energy: Springer, 2021, pp. 562-573, https://doi.org/10.1007/978-3-319-95864-4_84.

[2] M. Tuszkiewicz, E. W. Maruszewska, and O. Grzybek, "An experimental study of the effect of AIS automation and customization on project recommendation decision," Procedia Computer Science, vol. 192, pp. 1629-1638, 2021, https://doi.org/10.1016/j.procs.2021.08.167.

[3] H. N. H. Al-Hashimy, I. Said, and R. Ismail, "Evaluating the Impact of Computerized Accounting Information System on the Economic Performance of Construction Companies in Iraq," Informatica, vol. 46, no. 7, 2022, https://doi.org/10.31449/inf.v46i7.3920.

[4] J. Mökander, J. Morley, M. Taddeo, and L. Floridi, "Ethics-based auditing of automated decision-making systems: Nature, scope, and

limitations," Science and Engineering Ethics, vol. 27, no. 4, p. 44, 2021, https://doi.org/10.1007/s11948-021-00319-4.
[5] H. G. Brauch, "Peace ecology in the Anthropocene," Decolonising Conflicts, Security, Peace, Gender, Environment and Development in the Anthropocene, pp. 51-185, 2021, https://doi.org/10.1007/978-3-030-62316-6_2.
[6] R. H. BinSaeed, Z. Yousaf, A. Grigorescu, V. Radu, and A. A. Nassani, "Digital Revolution and Digitization Process to Promote AIS as a Vector of Financial Performance," Systems, vol. 11, no. 7, p. 339, 2023, https://doi.org/10.3390/systems11070339.
[7] M. Stanitsas, K. Kirytopoulos, and V. Leopoulos, "Integrating sustainability indicators into project management: The case of construction industry," Journal of Cleaner Production, vol. 279, p. 123774, 2021, https://doi.org/10.1016/j.jclepro.2020.123774.
[8] A. Olabi et al., "Assessment of the pre-combustion carbon capture contribution into sustainable development goals SDGs using novel indicators," Renewable and Sustainable Energy Reviews, vol. 153, p. 111710, 2022, https://doi.org/10.1016/j.rser.2021.111710.
[9] H. M. Al-Hattami, "Impact of AIS success on decision-making effectiveness among SMEs in less developed countries," Information Technology for Development, pp. 1-21, 2022, https://doi.org/10.1080/02681102.2022.2073325.
[10] D. Haluza and D. Jungwirth, "Artificial intelligence and ten societal megatrends: An exploratory study using GPT-3," Systems, vol. 11, no. 3, p. 120, 2023, https://doi.org/10.3390/systems11030120.
[11] A. Raihan, "The influences of economic progress, natural resources, and capitalization on financial development in the United States," Innovation and Green Development, vol. 3, no. 2, p. 100146, 2024, https://doi.org/10.1016/j.igd.2024.100146.
[12] R. Machová, R. Ambrus, T. Zsigmond, and F. Bakó, "The impact of green marketing on consumer behavior in the market of palm oil products," Sustainability, vol. 14, no. 3, p. 1364, 2022, https://doi.org/10.3390/su14031364.
[13] R. Cui and J. Wang, "Shaping sustainable development: External environmental pressure, exploratory green learning, and radical green innovation," Corporate Social Responsibility and Environmental Management, vol. 29, no. 3, pp. 481-495, 2022, https://doi.org/10.1002/csr.2213.
[14] M. Sharma, S. Luthra, S. Joshi, and A. Kumar, "Analysing the impact of sustainable human resource management practices and industry 4.0 technologies adoption on employability skills," International Journal of Manpower, vol. 43, no. 2, pp. 463-485, 2022, https://doi.org/10.1108/IJM-02-2021-0085.
[15] L. Xu and J. Tan, "Financial development, industrial structure and natural resource utilization efficiency in China," Resources Policy, vol. 66, p. 101642, 2020, https://doi.org/10.1016/j.resourpol.2020.101642.
[16] M. Zhu, W. Zhou, M. Hu, J. Du, and T. Yuan, "Evaluating the renewal degree for expressway regeneration projects based on a model integrating the fuzzy Delphi method, the fuzzy AHP method, and the TOPSIS method," Sustainability, vol. 15, no. 4, p. 3769, 2023, https://doi.org/10.3390/su15043769.
[17] E. Hayes-Larson, K. L. Kezios, S. J. Mooney, and G. Lovasi, "Who is in this study, anyway? Guidelines for a useful Table 1," Journal of clinical epidemiology, vol. 114, pp. 125-132, 2019, https://doi.org/10.1016/j.jclinepi.2019.06.011.
[18] J.-H. Cheah, M. Sarstedt, C. M. Ringle, T. Ramayah, and H. Ting, "Convergent validity assessment of formatively measured constructs in PLS-SEM: On using single-item versus multi-item measures in redundancy analyses," International Journal of Contemporary Hospitality Management, vol. 30, no. 11, pp. 3192-3210, 2018, https://doi.org/10.1108/ijchm-10-2017-0649.
[19] T. Raykov, G. A. Marcoulides, D. M. Dimitrov, and T. Li, "Examining construct congruence for psychometric tests: A note on an extension to binary items and nesting effects," Educational and Psychological Measurement, vol. 78, no. 1, pp. 167-174, 2018, https://doi.org/10.1177/0013164416655379.
[20] A. Sivakrishna, A. Adesina, P. Awoyera, and K. R. Kumar, "Green concrete: A review of recent developments," Materials Today: Proceedings, vol. 27, pp. 54-58, 2020, https://doi.org/10.1016/j.matpr.2019.08.202.
[21] M. Torlo, I. Kreso, and Š. Edin, "Renewable Energy Sources in Construction of Energy Efficient Residential Buildings," in New Technologies, Development and Application III 6, 2020: Springer, pp. 709-719, https://doi.org/10.1007/978-3-030-46817-0_81.
[22] S. Pradhan, S. G. Al-Ghamdi, and H. R. Mackey, "Greywater recycling in buildings using living walls and green roofs: A review of the applicability and challenges," Science of The Total Environment, vol. 652, pp. 330-344, 2019, https://doi.org/10.1016/j.scitotenv.2018.10.226.
[23] S. S. Beevi and B. P. Kumar, "Sustainable Solutions for Better Public Road Transportation," Shanlax International Journal of Economics, vol. 8, no. 4, pp. 37-42, 2020, https://doi.org/10.34293/economics.v8i4.3315.
[24] C. Efthymiou et al., "Indoor Environmental Quality Evaluation Strategy as an Upgrade (Renovation) Measure in a Historic Building Located in the Mediterranean Zone (Athens, Greece)," Applied Sciences, vol. 11, no. 21, p. 10133, 2021, https://doi.org/10.3390/app112110133.
[25] M. El Khatib, K. Alabdooli, A. AlKaabi, and S. Al Harmoodi, "Sustainable Project Management: Trends and Alignment," Theoretical Economics Letters, vol. 10, no. 06, p. 1276, 2020, https://doi.org/10.4236/tel.2020.106078.
[26] T. O. Olawumi and D. W. Chan, "Critical success factors for implementing building information modeling and sustainability practices in construction projects: A Delphi survey," Sustainable Development, vol. 27, no. 4, pp. 587-602, 2019, https://doi.org/10.1002/sd.1925.
[27] M. Hu and M. J. Skibniewski, "A review of building construction cost research: Current status, gaps and green buildings," Green Building & Construction Economics, pp. 1-17, 2021, https://doi.org/10.37256/gbce.212021768.
[28] L. Diago, E. Lacasa, L. Urmente, I. Millán, and J. Santolaya, "Integrating Sustainability in Product Development Projects," in Advances on Mechanics, Design Engineering and Manufacturing II: Proceedings of the International Joint Conference on Mechanics, Design Engineering & Advanced Manufacturing (JCM 2018), 2019: Springer, pp. 13-22, https://doi.org/10.1007/978-3-030-12346-8_2.
[29] J. G. Backes and M. Traverso, "Application of life cycle sustainability assessment in the construction sector: A systematic literature review," Processes, vol. 9, no. 7, p. 1248, 2021, https://doi.org/10.3390/pr9071248.
[30] R. Maqbool, X. Deng, and Y. Rashid, "Stakeholders' satisfaction as a key determinant of critical success factors in renewable energy projects," Energy, Sustainability and Society, vol. 10, no. 1, pp. 1-15, 2020, https://doi.org/10.1186/s13705-020-00259-0.
[31] M. B. Shaukat, K. F. Latif, A. Sajjad, and G. Eweje, "Revisiting the relationship between sustainable project management and project success: The moderating role of stakeholder engagement and team building," Sustainable Development, vol. 30, no. 1, pp. 58-75, 2022, https://doi.org/10.1002/sd.2228.
[32] M. Waris, Z. S. Azlan, P. F. M. Tamyez, M. Ullah, and A. Khan, "Analyzing the constructs of stakeholder engagement towards renewable energy projects success in Malaysia: A PLS approach," KnE Social Sciences, pp. 818–843-818–843, 2019, https://doi.org/10.18502/kss.v3i22.5090.
[33] G. Castelblanco, J. Guevara, D. Rojas, J. Correa, and K. Verhoest, "Environmental Impact Assessment Effectiveness in Public–Private

Partnerships: Study on the Colombian Toll Road Program," Journal of Management in Engineering, vol. 39, no. 2, p. 05023002, 2023, https://doi.org/10.1061/JMENEA.MEENG-5015.

[34] H. O. Onubi and A. S. Hassan, "How environmental performance influence client satisfaction on projects that adopt green construction practices: The role of economic performance and client types," Journal of Cleaner Production, vol. 272, p. 122763, 2020, https://doi.org/10.1016/j.jclepro.2020.122763.

[35] R. M. Matakanye, H. M. van der Poll, and B. Muchara, "Do companies in different industries respond differently to stakeholders' pressures when prioritising environmental, social and governance sustainability performance?," Sustainability, vol. 13, no. 21, p. 12022, 2021, https://doi.org/10.3390/su132112022.

[36] Q. Wang, H. Li, Y. Li, and J. Liu, "How Do Perceived Regulations Influence Environmentally Sustainable Project Management? The Mediating Role of Commitment and Moderating Role of Triple Constraint," Buildings, vol. 13, no. 4, p. 955, 2023, https://doi.org/10.3390/buildings13040955.

[37] N. Semenova, "The public effect of private sustainability reporting: Evidence from incident-based engagement strategy," Journal of Business Ethics, vol. 182, no. 2, pp. 559-572, 2023, https://doi.org/10.1007/s10551-021-05007-8.

[38] N. Srinivasan and S. Dhivya, "An empirical study on stakeholder management in construction projects," Materials Today: Proceedings, vol. 21, pp. 60-62, 2020, https://doi.org/10.1016/j.matpr.2019.05.361.

[39] E. D. Omopariola, A. Windapo, D. J. Edwards, and H. El-Gohary, "Level of financial performance of selected construction companies in South Africa," Journal of Risk and Financial Management, vol. 14, no. 11, p. 518, 2021, https://doi.org/10.3390/jrfm14110518.

[40] M. Chipulu et al., "A dimensional analysis of stakeholder assessment of project outcomes," Production Planning & Control, vol. 30, no. 13, pp. 1072-1090, 2019, https://doi.org/10.1080/09537287.2019.1567859.

[41] N. Van Du, L. D. Thuc, and H.-B. Tran, "Assessing stakeholder satisfaction in PPP transport projects in developing countries: Evidence from Vietnam," Built Environment Project and Asset Management, vol. 12, no. 2, pp. 309-324, 2022, https://doi.org/10.1108/BEPAM-08-2021-0106.

[42] E. Princes and A. Said, "The impacts of project complexity, trust in leader, performance readiness and situational leadership on financial sustainability," International Journal of Managing Projects in Business, vol. 15, no. 4, pp. 619-644, 2022, https://doi.org/10.1108/IJMPB-03-2021-0082.

[43] G. Silvius and R. Schipper, "Exploring the relationship between sustainability and project success-conceptual model and expected relationships," International Journal of Information Systems and Project Management, vol. 4, no. 3, pp. 5-22, 2016.

[44] E. Johnson, I. Hemmatian, L. Lanahan, and A. M. Joshi, "A framework and databases for measuring entrepreneurial ecosystems," Research Policy, vol. 51, no. 2, p. 104398, 2022, https://doi.org/10.1016/j.respol.2021.104398.

[45] J. F. Hair Jr et al., "Evaluation of formative measurement models," Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R: A Workbook, pp. 91-113, 2021.

[46] N. H. Mohd Dzin and Y. F. Lay, "Assessing the Validity and Reliability of Science Multiple Choice Test Using Rasch Dichotomous Measurement Model," Journal of Baltic Science Education, vol. 20, no. 6, pp. 927-941, 2021.

[47] N. Kock, "Stable P value calculation methods in PLS-SEM," Laredo, TX: ScriptWarp Systems, pp. 1-15, 2014.

[48] R. Deloria, A. J. Kivisto, A. Swier-Vosnos, and L. Elwood, "Optimal per test cutoff scores and combinations of failure on multiple embedded performance validity tests in detecting performance invalidity in a mixed clinical sample," Applied Neuropsychology: Adult, pp. 1-11, 2021, https://doi.org/10.1080/23279095.2021.1973005.

[49] J. K. Witt, "Insights into criteria for statistical significance from signal detection analysis," Meta-Psychology, vol. 3, 2019, https://doi.org/10.15626/MP.2018.871.

[50] L. S. Lambert and D. A. Newman, "Construct development and validation in three practical steps: Recommendations for reviewers, editors, and authors," Organizational Research Methods, p. 10944281221115374, 2022, https://doi.org/10.1177/10944281221115374.

[51] E. M. Kamal, E. C. Lou, and A. M. Kamaruddeen, "Effects of innovation capability on radical and incremental innovations and business performance relationships," Journal of Engineering and Technology Management, vol. 67, p. 101726, 2023, https://doi.org/10.1016/j.jengtecman.2022.101726.

[52] M. A. Kraft, "Interpreting effect sizes of education interventions," Educational Researcher, vol. 49, no. 4, pp. 241-253, 2020, https://doi.org/10.3102/0013189X20912798.

[53] X.-M. Loh, V.-H. Lee, G. W.-H. Tan, K.-B. Ooi, and Y. K. Dwivedi, "Switching from cash to mobile payment: what's the hold-up?," Internet Research, vol. 31, no. 1, pp. 376-399, 2021, https://doi.org/10.1108/INTR-04-2020-0175.