International Journal of Business and Technology Management
e-ISSN: 2682-7646 | Vol.5, No. 1, 514-529, 2023
http://myjms.mohe.gov.my/index.php/ijbtm

The Relationship Between Project Risk Management Framework and Sustainable Development of Mud Architecture Building in Yemen

Mazen Ebrahim Sheikh Al-Masawa[1*], Nazliatul Aniza Abdul Aziz[1], Norlida Abdul Manab[1], Abdelnaser Omran[2]

[1] School of Economics, Finance and Banking, College of Business, Universiti Utara Malaysia, Sintok, Malaysia
[2] Faculty of Engineering Sciences, Bright Star University, Libya

*Corresponding Author: masawaphd@gmail.com ; naserelamroni@yahoo.co.uk

Accepted: 15 April 2023 | Published: 30 April 2023

DOI: https://doi.org/10.55057/ijbtm.2023.5.1.39

Abstract: *This study was carried out to examine whether project risk management framework affect the sustainable development of mud architecture building in Yemen. The targeted population in this study was 260 projects of mud buildings implemented in the areas of Wadi Hadramout city. The study utilized a stratified sampling method and divided the population into three strata as represented by the geographical location within the main cities in Wadi. The modelling aspect of the study was performed using the structural formula of partial least squares (PLS-SEM, v3.2.7). The paper revealed the relationship between project risk management framework, and Sustainable Development was found a positive and significant at the level of 0.05. The findings are important contributions for policymakers and practitioners, offering valuable information on how project risk management framework can be integrated to achieve ssustainable development.*

Keywords: Project RM framework, Sustainable development, Mud architecture building, Wadi Hadhramaut, Yemen

1. Introduction

As noted by Silvius and Schipper (2014), sustainability has an effect on project management at various levels. It requires a shift of focus in the running of projects, from managing budget, time, and quality to social, environmental, and economic effects. Additionally, it entails a change of mind for the project director from providing requested results, to taking responsibility for SD in organizations and society at large. Among the factors that can influence the success of a project outcome is effective risk management (Apine & Valdés, 2017). Risk management is an important part of project management, and the construction sector is no different. The significance of project management is increasing because projects usually fail to meet deadlines and they overshoot estimated costs (Iqbal et al. 2015). If project management is utilized in an efficient and effective manner, it can influence the outcome and successful implementation of projects (Serpell et al., 2015). Construction projects are usually complex and different; they are usually considered complex activities where even a small-sized project involves numerous skills, materials, and many activities (Apine & Valdés, 2017).

Copyright © 2023 ASIAN SCHOLARS NETWORK - All rights reserved

Risk management is often considered a very crucial procedure and capability in the area of project management (Jarkas & Haupt, 2015). Additionally, it is a common subject in construction, engineering, and management research. It has witnessed a significant number of research attention for many years (Hwang et al., 2017). It is seen as an important managerial process in achieving set goals in terms of time, quality, cost, safety, and environmental sustenance. RM involves identifying and evaluating risks and mitigating their occurrence (Gupta et al., 2016). Although mud architecture structures in Wadi Hadhramaut, Yemen, have endured for hundreds of years, they have recently been impacted by numerous threats that endanger them on a local, regional, and global scale (Baeissa, 2014). According to Baeissa (2014), in recent times, re-establishing the architectural practice of mud architecture building in Wadi Hadhramaut in Yemen is becoming more challenging and there is a need to mitigate the risks arising from the modern, social, political, and economic changes. Petzet and Koenigs (2015) indicated that more than 550 mud buildings in Shibam city in Yemen are in very bad condition and some houses have already collapsed. He issued an alarm that Yemen's heritage is currently at risk. Furthermore, the destruction of many mud buildings in the catastrophe of October 2008 in Hadhramaut highlighted many concerns and questions about mud buildings and their sustainability in the future. Hence, it is crucial to investigate ways of managing project risks of mud architecture buildings to attain SD. The objective of this study is to examine the effect of a project risk management framework on the sustainable development of mud architecture buildings.

2. Literature review

2.1 Risk Management (RM)

Risks at both the corporate and project levels frequently need to be managed to, among other things, minimize their impact on success goals. Additionally, risk management is essentially a way to manage the inherent risks that come with an organization from all angles and at both the corporate and project levels, if not completely eliminating them, then at least minimizing them to the lowest level, among other things, minimize their impact on the successful achievement of objectives. However, because "risk" has so many diverse connotations, risk management has many varied connotations as well (Garbababa, 2014). For example, Schmit and Roth (1990) described RM as the undertaking of activities to reduce the negative effect of uncertainty and possible loss (Schmit & Roth, 1990). Another definition of RM is provided by Siegel and Alwang (1999) based on RM in the household; they defined it as the set of mechanisms utilized by households in dealing with expected or actual losses associated with uncertain occurrences and results (Siegel & Alwang, 1999, p.3). It is a means of identifying, analyzing, mitigating, and managing the risks associated with any activity or process.

Furthermore, Uher and Toakley (1999) described RM as "a procedure to control the level of risk and mitigate its effects on the objectives" (Uher & Toakley, 1999, p.161). As per Wang et al. (2004), risk management is the process of recognizing, analyzing, and making a response to risk in all stages of a project lifecycle in a systematic manner to attain the optimal level of risk avoidance, mitigation, and control (Wang, Dulaimi, & Aguria, 2004, p.238). On the other hand, organizations and bodies have various descriptions of RM. For example, project RM, according to Project Management Association (PMI, 2017), is one of the nine areas of a risk manager's knowledge; it defined RM as the systematic process of identifying, analyzing, and controlling project risks to maximize positive results and minimize negative results. The Australian Standard RM defined RM as "the collection of culture, processes, and structures that are directed toward realizing potential opportunities while managing adverse effects" (Moraru, 2012, p.31). According to ISO 31.000:2009, RM is "the manner of systematic

Copyright © 2023 ASIAN SCHOLARS NETWORK - All rights reserved

application of management activities, procedures and practices to the activities of communicating, consulting, establishing the context, and identifying, analyzing, evaluating, treating, monitoring and reviewing risk" (ISO 31000, 2009). Today, RM is a vital part of project management and is getting more significant. The process of handling opportunities and associated risk in projects is a part of project management (Cooper et al., 2005). The goals of businesses can be attained better by utilizing RM principles, with advantages such as detecting likely bad outcomes and also taking advantage of favorable opportunities (Monetti et al., 2006). Predicting the risks inherent in the actions of businesses and projects, and mitigating them, is a basic requirement in the course of making decisions in organizations because this will have an effect on the expected results. Furthermore, it is closely linked to good decision making and it can be related closely to risks as almost all decision entails likely risks (Pritchard, 2015). The RM process of a project is vital to enable the attainment of the objectives of the project. Any unforeseen occurrence, opportunity, or risk, requires to be handled efficiently to prevent adverse consequences and to increase the expected results (Apine & Valdés, 2017). However, as noted by Loosemore et al. (2006), effective project RM needs to proactively work with project members to lower the risks and enhance the opportunities linked with project decisions; it also demands a clear and reasonable approach.

In the construction projects domain, RM in projects leads to the success of the projects. Teller and Kock (2013) asserted that risk identification and RM capacity have a direct influence on successful project completion. Ismail et al. (2012) identified RM as one of the management factors for successful industrialized building system (IBS) projects implementation. Also, for sustainable social housing in Nigeria, Ihuah et al. (2014) investigated project RM as one of the success factors for social (public) housing estates' delivery and provision. Success in RM in a project is one of the requirements of current construction project management. Taking care of the risks of building projects will enhance profitability and outcomes (Sharma & Swain, 2011). In the last four decades, RM studies have increased immensely in the construction sector (Chapman & Ward, 2011; Lehtiranta, 2011) because building projects are always associated with risks and are considered projects with more associated risks due to the participation of numerous stakeholders. Therefore, there is an extensive literature in the field of risk management of construction projects (Serpell et al., 2015).

2.2 Project Risk Management Framework

The creation and establishment of a suitable methodology or framework improve the efficacy and efficiency of the risk management process. In contrast, Lundqvist (2014) stated that the inconsistencies in the linkage between risk management and firm performance were because of the inadequate specification of risk management frameworks. Therefore, a risk management framework became a need and important to effectively identify, assess, and manage risks as it offers the key principles, clear focus, guidance, and a common language that has become even more necessary (COSO, 2004). It has been found as an essential requirement for managing risks in construction projects (Firmenich, 2017). British Standard BS 31100 (Gjerdum, 2015) defined the risk management framework as a group of related activities that involve the basic and institutional aspects, including designing, executing, monitoring, controlling, and continuously improving risk management processes in an organization (Gjerdum, 2015). The basic requirements include the objectives, a mandate, and a commitment to RM. The institutional arrangements involve plans, associations, responsibilities, resources, procedures, and activities. The RM framework is included in the institutions' strategic and operational practices and procedures (Hopkin, 2018). The purpose of the project RM framework is to provide the construction sector with an organized and practical guideline that is easy to implement in the handling of risks and more importantly, to promote the use of a standardized

Copyright © 2023 ASIAN SCHOLARS NETWORK - All rights reserved

means of managing risk effectively (Otobo, 2016). According to Tah and Carr (2001), a comprehensive and continuous RM framework can improve the likelihood of success of a project and also ensure the project establishes practices that are sustainable and continuously improving. Table 1 presents some of the frameworks, standards, and guidelines provided by numerous professional bodies to provide guidelines to practitioners to ensure the effective utilization of RM practices (Garbababa, 2014). All the standard risk management practices refer to the risk management framework, but they are framed in different manners (Hopkin, 2018). On examination of available standards and guidelines, Bu-Qammaz et al. (2009) identified that they take on different scopes; some consider the broad perspective of risk management, while others consider a limited scope and are meant for a project set up for businesses. In a comparison of these methods, however, disagreements over terminologies and overlapping constructs always come up, since they arose from different perspectives and have different objectives to fulfill (Aloini, Dulmin, &Mininno, 2012). According to Hopkin (2018), in all cases, the major factors of a successful RM framework are the reporting and communication framework, the entire RM strategy that is being utilized by the firm, and the procedures and guidelines that are in place. For example, the Project Risk Analysis and Management Guide (PRAM) suggested by APM (2004) in Table (1) covers both the qualitative and quantitative risk analysis procedure in a more balanced manner. But most of the quantitative methods offered are based on statistical and probabilistic methods (Otobo, 2016). A methodology created by ICE et al. (2005) is represented in Table (1) as Risk Analysis and Management for Project (RAMP); it provides a more comprehensive definition of projects that includes both the planning and execution phases. It focuses on the tactical side of risk assessment and management and advises users to consult PRAM for quantitative methods (Otobo, 2016). A new standard known as IS0 31000 was published in 2009 by the Geneva-based International Organization for Standardization, as stated in Table 2. (Dallas, 2013). The standard offers a list of basic principles and features. It also provides a best-practice approach to risk management that is structured and continuing in terms of internal communication (Ishak, 2015). According to Purdy (2010), the IS0 31000 was created over the course of four years, via seven iterations, and with the input of hundreds of risk management experts from all around the world. The new standard aims to start the process of resolving the numerous contradictions and ambiguities that exist between numerous different approaches and definitions and supports a new, straightforward way of thinking about risk and risk management (Purdy, 2010). The risk management process must be carried out continuously and consistently throughout the project lifespan; it cannot be done once and for all (Karim et al., 2012). Despite having varying names and descriptions, these risk management strategies all involve the same crucial steps. These risk management procedures are a reference for creating a conceptual framework for risk management of building projects in poor nations (Otobo, 2016).

Table 1: Risk Management frameworks, standards and guidelines
Source: ISO (2015); Leitch (2010); Raz and Hillson (2005)

Reference/title	Standards body/publisher	Date
AS/NZS 4360:2004, Risk Management	Standards Australia, Homebush NSW 2140, Australia, and Standards New Zealand, Wellington 6001, New Zealand	2004
BS 6079-3:2000, Project Management – Part 3: Guide to the Management of Business-related Project Risk	British Standards Institution, London, UK	2000
BS 8444-3: 1996 (previously issued as 300-3-9:1995), Risk Management – Part 3: Guide to Risk Analysis of Technological Systems	British Standards Institution, London, UK	1996

Copyright © 2023 ASIAN SCHOLARS NETWORK - All rights reserved

CAN/CSA-Q850-97, Risk Management Guideline for Decision Makers	Canadian Standards Association, Ontario, Canada	1997
CP142 Operational Risk Systems and Controls	Financial Services Authority, London, UK	2002
IEEE 1540-2001, Standard for Software Life Cycle Processes – Risk Management	The Institute of Electrical and Electronic Engineers, Inc., USA	2001
ISO 14001: 2004, Environmental Management Systems – Requirements with Guidelines for Use	International Organization for Standardization, Geneva, Switzerland	2004
ISO/IEC 17799:2005, Information Technology – Security Techniques – Code of Practice for Information Security Management	International Organization for Standardization/International Electro technical Commission, Geneva, Switzerland	2005
IEC 62198:2001, Project Risk Management – Application Guidelines	International Electro technical Commission, Geneva, Switzerland	2001
JIS Q 2001:2001 (E), Guidelines for Development and Implementation of Risk Management System	Japanese Standards Association, Tokyo, Japan	2001
PAS 56:2003, Guide to Business Continuity Management	British Standards Institution, London, UK	2003
PD 6668:2000, Managing Risk for Corporate Governance	British Standards Institution, London, UK	2000
PD ISO/IEC Guide 73:2002, Risk Management – Vocabulary – Guidelines for Use in Standards	British Standards Institution, London, UK	2002
A Guide to the Project Management Body of Knowledge (PMBok®), British 3rdedn., ch.11 Project Risk Management	Project Management Institute, Philadelphia, PA, USA.	2004
A Risk Management Standard	Institute of Risk Management (IRM), 2002, Association of Insurance and Risk Managers (AIRMIC), and National Forum for Risk Management in the Public Sector (ALARM), London, U.K.	2002
Continuous Risk Management Guidebook	Software Engineering Institute (SEI), Carnegie Mellon University, USA	1996
Enterprise Risk Management – Integrated Framework	The Committee of Sponsoring Organizations of the Treadway Commission, USA	2004
Guidelines for Environmental Risk Assessment and Management	DETR, Environment Agency and IEH/ The Stationery Office, London, UK	2000
Guidelines on Risk Issues	The Engineering Council, London, UK	1995
Management of Risk – Guidance for Practitioners	UK Office of Government Commerce (OGC)/The Stationery Office, London, UK	2002
Project Risk Analysis & Management (PRAM) Guide, 2ndedn	Association for Project Management /APM Publishing, High Wycombe, Bucks, UK	2004
Risk Analysis and Management for Projects (RAMP) 2ndedn.	Institution of Civil Engineers, Faculty of Actuaries and Institute of Actuaries/Thomas Telford, London, UK	2005
ISO 31000:2009. Risk management—Principles and guidelines	International Organization for Standardization	2009
ISO 19600:2014, Compliance management systems	International Organization for Standardisation (ISO) for compliance management and risk management	2014
ISO 9001:2015 – quality management systems	International Organization for Standardization (ISO)	2015

According to Hopkin (2018), RM cannot occur in isolation; it should be accompanied by a framework in the company. Furthermore, the RM framework has been explained in different ways in terms of guidelines, standards, and other publications. The combination of RM

Copyright © 2023 ASIAN SCHOLARS NETWORK - All rights reserved

processes with a description of the framework in place to support the process form an RM standard. For instance, the ISO 3100 standard described the essential rudiments for practical implementation of the RM framework; they include principles, structure, and process (Gjerdum, 2015). Figure (1) is a diagram of the ISO 31000 indicating the steps for the application of the RM process.

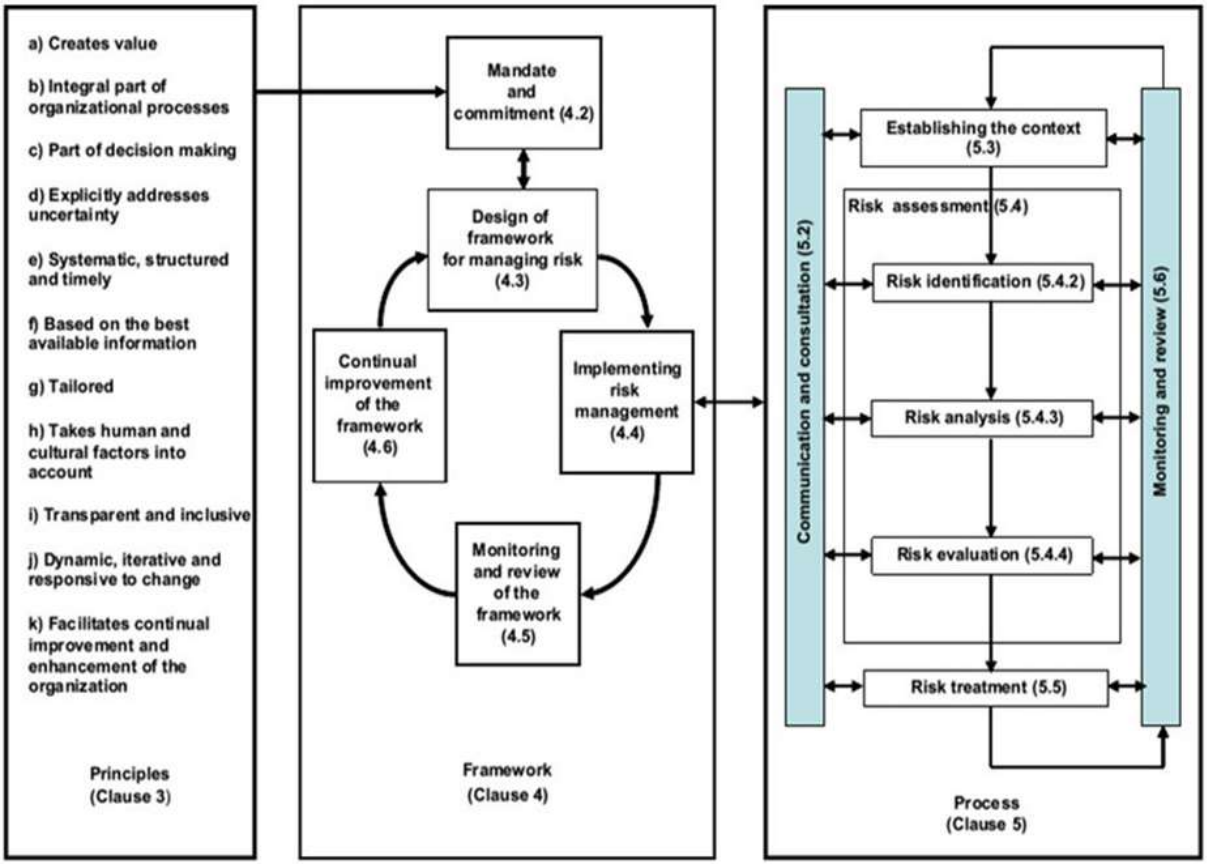


Figure 1: ISO 31000: Principles, framework, and Process
Source: ISO 31000 (2009)

In the field of mud architecture building considered in this study, Apine and Valdés (2017) depended on the RM framework in Figure 2 which was considered in PMI (2017) to describe the relationship between sustainable construction and project life cycle which is considered appropriate for this study.

Copyright © 2023 ASIAN SCHOLARS NETWORK - All rights reserved

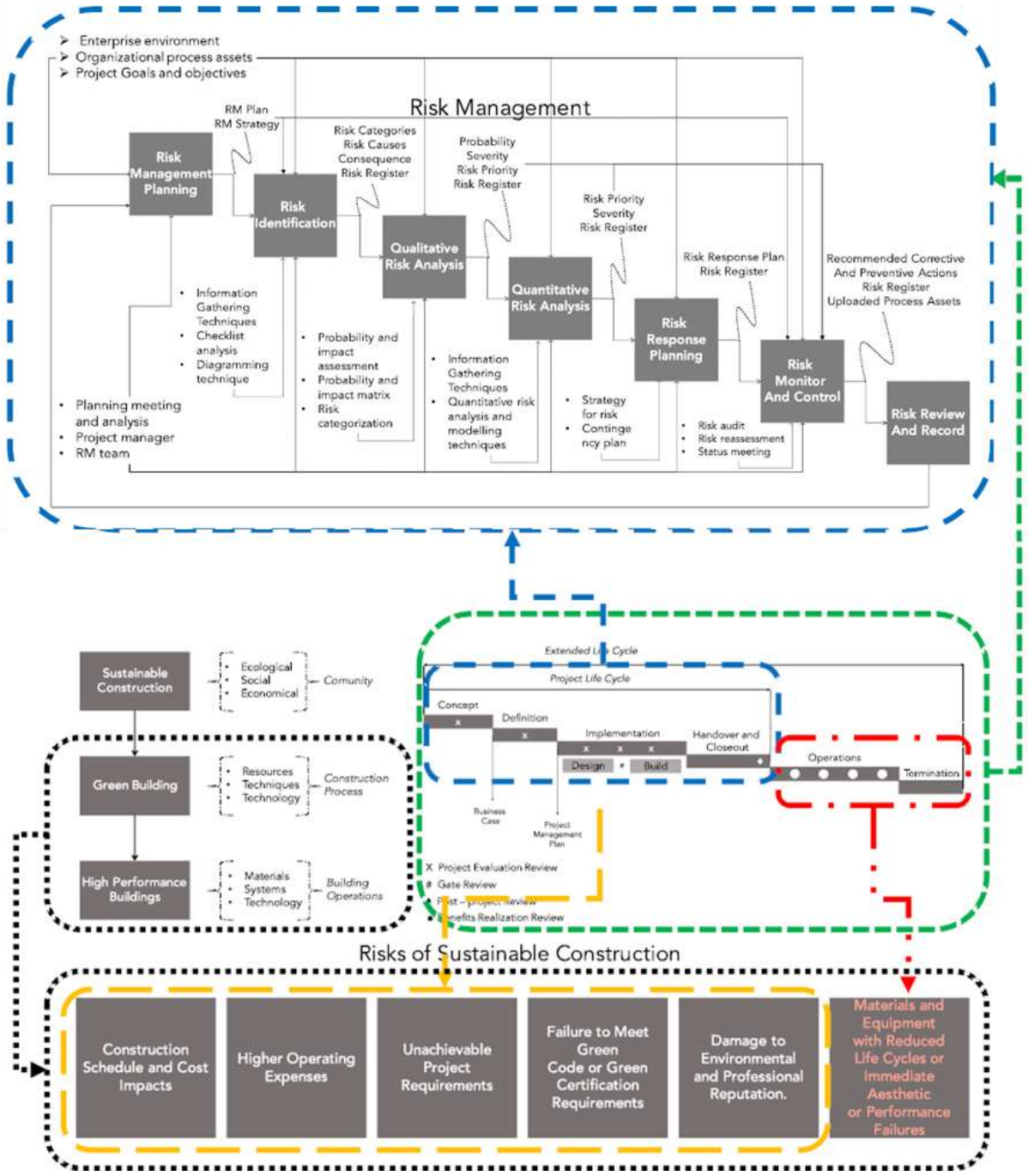


Figure 2: Framework of relationship between RM, sustainable construction and project life cycle
Source: Apine and Valdés (2017)

Many organizational efforts have failed to develop project risk management practices because of a lack of comprehensive risk management frameworks. Without a complete and comprehensive framework, it is difficult for organizations to integrate different types of risks in different parts of the projects (Manab, 2009). The study by Ahmed and Manab (2016) investigated the influence of enterprise risk management framework implementation on firm performance in the Nigerian financial sector. They identified a significant positive impact of enterprise risk management framework implementation on the financial and non-financial performance of the Nigerian financial sector. Ultimately, the study found that the companies and practitioners that implemented project risk management holistically were able to improve their management practices and achieved SD.

Copyright © 2023 ASIAN SCHOLARS NETWORK - All rights reserved

2.3 Sustainable Development

sustainable Development gained momentum due to massive and ongoing adverse environmental impacts experienced by society. The construction industry has a severe impact on the environment and social well-being (Baloi, 2003). The building sector is one of the essential parts of modern society. Buildings have a huge impact on the environment, resource use and human health and productivity (Hassan, 2016). According to Martens and Carvalho (2016), as the projects, especially complex ones involving huge number of resources and impacting on the daily lives of the immediate communities, the issue of sustainability is urgently required. Consequently, the building sector has a great potential to achieve SD goals by promoting environmental quality, economic vitality and social benefits (Hassan, 2016). There are many studies outline the link between SD as a concept and different areas within the building sector. Giama and Papadopoulos (2002) studied certification schemes and standards for sustainable building management and concluded that the development of assessment systems and indicators to measure sustainable buildings can play an effective role in the environmental performance of buildings and in the integration of the SD of building into the design, construction and marketing practices. Consequently, according to Schroeder (2016), all buildings constructed according to the requirements of sustainable building must meet predefined technical parameters and corresponding quality levels in terms of planning and construction for each of the three aspects.

According to the United Nations Conference on Environment and Development (UNCED) Brundtland Commission (1987), sustainable construction defined as a construction that fulfils the need of contemporary society without denying the future generation the ability to meet its needs. According to Hamard et al. (2016), the willing of reducing environmental and social impact of building industry has led to a renewed interest in mud construction. Mud construction is an environmentally friendly method with a social and cultural emphasis; its benefits are increased when this type of construction is applied in low income nations where the costs of material counterbalance labour costs, and where other materials and methods are scarce and unaffordable (Ciancio et al., 2013; Costa et al., 2016). Therefore, the current interest in soil as a building material arose due to several qualities of earth such as being readily available and being able to be recycled. It is also suitable for satisfying the requirement of low-cost houses, self-building practices and conservation of natural resources (Pacheco-Torgal & Jalali, 2012). These features make soil material like mud and the construction method is highly competitive when compared to the modern ones (Mileto et al., 2014). Thus, according to the discussion on social, economic and environmental benefits associated with use of earth reveals that when soil is used as raw material on site both financial and environmental impact of the construction are significantly reduced (Falceto et al., 2012). A broader concept of SD which used by most researchers is based on the combination of the three aspects of environmental, economic and social considerations. For example, Vos (2007) maintained that almost all shared essential elements of SD were related to environmental, economic, and social considerations. According to Said and Berger (2014), SD should be all-encompassing and take into account all the following three bottom line considerations. These three domains are usually seen as the 3 foundations of SD or the Triple Bottom Line (TBL) and which became widely known (Carew & Mitchell, 2008; Kat et al., 2003). These three elements reciprocally reinforce one another. Economic growth and social well-being are supported by environmental considerations, and vice versa (Svensson & Wagner, 2015). However, in order to sustain environmental and social practices, the choices must be economically sustainable (Illankoon et al. 2016). Therefore, the study focuses below on the measures of the three dimensions of SD including economic, social and environment aspects.

Copyright © 2023 ASIAN SCHOLARS NETWORK - All rights reserved

3. Research method

Figure (3) presents the research framework which was developed from the review of the literature specifically to address the problem of the study. This research framework shows the relationship between project RM framework along SD.

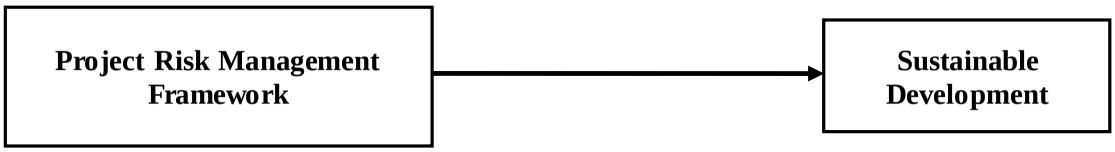


Figure 3: Research Framework

Consistent with the theoretical justifications and empirical studies provided in the literature, hypothesis was developed for testing empirically. The research question is, Does project RM framework affect the sustainable development of mud architecture building? As reviewed in literature review, this element has been proved in empirical studies which found that project RM framework has a positive relationship with RM implementation and sustainable, in which also related to H1. Therefore, the First hypothesis can be determined as:

H: There is a significant relationship between project management framework of project RM on mud architecture building and SD.

This study was utilized a stratified sampling method and divided the population into three strata as represented by geographical location within the main cities in Wadi Hadhramaut, Yemen as: Seiyun, Tarim and Shibam. Of 807 projects, only 260 questionnaires were distributed to each city proportionately as 104 in Seiyun, 96 in Tarim and 60 in Shibam. A five-point Likert scale ranging from 1 = not very important to 5 = very important was used to indicate the extent of importance for each of the questions in the questionnaire.

4. Results and discussion

4.1 Descriptive Analysis of Constructs

The constructs of this study are project management framework and sustainable development. The results of each construct are discussed separately to gain a better understanding of the findings. Project risk management framework is one of the main constructs. Table (2) shows the mean, standard deviation, minimum and maximum scores of project management framework items.

Table 2: Descriptive Statistics of Project Risk Management Framework Construct

Items	Code
1. There is common understanding about project risk management objectives	PF1
2. Demonstrate the best risk management practices in the project	PF2
3. Provide a clear direction and guidance for master builders and workers in the project	PF3
4. Align risk appetite with strategy	PF4
5. Support the company's goals and objectives	PF5
6. Enhance risk response decisions in the project	PF6

Project risk management framework was measured by using six items. As illustrated in Table 2, the mean score for those items ranges from 3.86 to 3.97, which reflects the level of agreement

Copyright © 2023 ASIAN SCHOLARS NETWORK - All rights reserved

toward these items. The high mean score with project risk management framework indicates that individuals pay attention to guide and adopt project risk management. In addition, the standard deviation of project risk management framework is with a range from 0.53 to 0.62 for all items, indicating that the majority of responses are close to mean. Thus, the result of descriptive statistics indicates that respondents provide project risk management framework characteristics within their organizations. In conducted study, sustainable development is the dependent variable, and it was measured by using 10 items. A five-point Likert scale was employed. Based on the result of descriptive statistics, the mean value for each item ranges between 4.08 and 4.23. In addition, the standard deviation of sustainable development is with a range from 0.48 to 0.64, which means that the majority of responses are cluster around to the mean. The respondents believe that the highest mean value is SD1 with 4.23 (Protection of the environment is a key for environmental sustainability reasons/benefits for mud architecture building projects); followed by SD6 and SD8 with mean score of 4.22, while the lowest mean value is for SD5 (Reducing construction and operating cost is a key for economic sustainability reasons/benefits for mud architecture building projects) with mean score of 4.08.

Table 3: Descriptive Statistics of the Sustainable Development (SD) Construct

Construct	Code
Protection of the environment is a key for environmental sustainability reasons/benefits for mud architecture building projects	SD1
Minimizing ecological impact of buildings is a key for environmental sustainability reasons/benefits for mud architecture building projects	SD2
Improving indoor environment quality is a key for environmental sustainability reasons/benefits for mud architecture building projects	SD3
Waste reduction is a key for environmental sustainability reasons/benefits for mud architecture building projects	SD4
Reducing construction and operating cost is a key for economic sustainability reasons/benefits for mud architecture building projects	SD5
Job creation for local people is a key for economic and social sustainability reasons/benefits for mud architecture building projects	SD6
Financial benefits is a key for economic sustainability reasons/benefits for mud architecture building projects	SD7
Enhancement of social/community relationships is a key for social sustainability reasons/benefits for mud architecture building projects	SD8
Improved learning and training of workers is a key for social and economic sustainability reasons/benefits for mud architecture building projects	SD9
Relevance to local culture and heritage is a key for social sustainability reasons/benefits for mud architecture building projects	SD10

4.2 Assessment of the Model Quality

The original model of the current study involved 16 reflective items (manifest variables) for two main variables (latent variables), which are: project RM framework as independent variable and sustainable development as dependent variable. (see Figure 4).

Copyright © 2023 ASIAN SCHOLARS NETWORK - All rights reserved

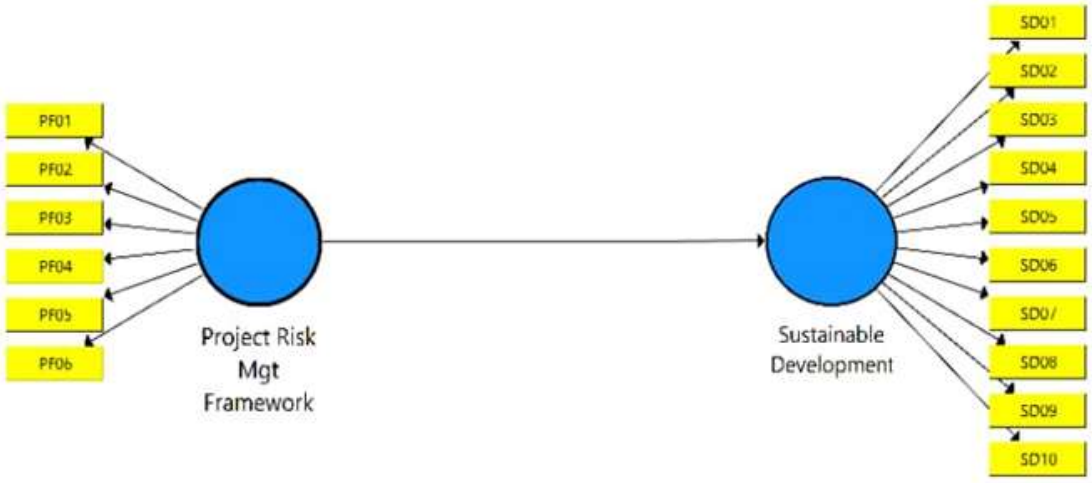


Figure 4: Hypothesized Model

4.3 Average Variance Extracted (AVE)

Table (4) shows that the AVE values were 0.946 and 0.921for both project risk management and sustainable development. All of these values were above the cut-off 0.5 as suggested by Hair et al. (2016). The composite reliability values presented in Table (4) exceeded the recommended value of 0.6 for all constructs. Similarly, the Cronbach's Alpha values for the factors as shown in Table (4) were all beyond the threshold of 0.7. Thus, indicate that the data gathered from the survey were interrelated and the five-point Likert scale used for measuring the factors is reliable.

Table 4: Results of Reliability & Convergent Validity

Construct	Item		Loadings	Alpha	CR	AVE
Project Management Factors	PF01		0.974	0.919	0.946	0.818
		PF02	0.67			
		PF03	0.972			
		PF04	Deleted			
		PF05	0.964			
		PF06	Deleted			
Sustainable Development	SD01		0.802	0.905	0.921	0.541
		SD02	0.739			
		SD03	0.612			
		SD04	0.786			
		SD05	0.727			
		SD06	0.799			
		SD07	0.737			
		SD08	0.63			
		SD09	0.775			
		SD10	0.723			

4.4 Hypotheses Testing (Path Coefficient)

H1: Results reveal that the hypothesized effect of project management framework of project RM on mud architecture building, and SD is positive and significant (β =0.145, t =2.171, $p<0.05$); hence, H1 is supported.

Copyright © 2023 ASIAN SCHOLARS NETWORK - All rights reserved

5. Conclusion

This paper examined the relationship between Project Risk Management (RM) Framework on Architecture Building and Sustainable Development (ABSD) and Sustainable Development (SD) on Mud Architecture Building in Yemen. The paper revealed the relationship between project risk management framework, and sustainable development was found a positive and significant at the level of 0.05, supporting hypothesis H1 (β= 0.145, t=2.171, p<0.05). It can be stated that good framework should lead to further expansion and the addition of more complex techniques. A comprehensive and continuous risk management framework can improve the likelihood of success of a project and also ensure the project risk management establishes practices that are sustainable and continuously improving same as concluded by (Tah and Carr, 2001). Effective project RM framework provides a smooth flow of accurate, real-time material for the companies. In other words, managers may use framework as a basis to develop their sustain. They can also channel such finding to top management, which will be very useful for them in the sustainable development. Given the uncertainty and concern about how to value project RM framework, this research indicates that without the development of project RM Framework, the companies will not succeed in developing and achieving sustainable. Therefore, companies must think of project RM framework as a foundation of their sources to develop and sustain of mud buildings (Tah & Carr 2001; Abbas et al., 2016).

References

Abbas, A., Amjath-Babu, T.S., Kächele, H., Usman, M., & Müller, K. (2016). An overview of flood mitigation strategy and research support in South Asia: Implications for sustainable flood risk management. In International Journal of Sustainable Development and World Ecology (Vol. 23, Issue 1, pp. 98–111). Taylor and Francis Ltd. https://doi.org/10.1080/13504509.2015.1111954

Ahmed, I., & Manab, N.A. (2016). Moderating Effects of Board Equity Ownership on the Relationship between Enterprise Risk Management and Firms Performance: Data Screening and Measurement Model. Research Journal of Finance and Accounting, 7(6), 2222–2847. https://doi.org/10.9790/487X-18126168

Aloini, D., Dulmin, R., &Mininno, V. (2012). Risk assessment in ERP projects. Information Systems, 37(3), 183–199. https://doi.org/10.1016/j.is.2011.10.001

Apine, A., & Valdés, F.J.E. (2017). Risk Management in Sustainable Projects in the Construction Industry: Cases of Swedish Companies [Master thesis]. Umeå School of Business and Economics.

Baeissa, A.A. (2014). Mud-Brick High-Rise Buildings Architectural Linkages for Thermal Comfort in HadhramoutValley , Yemen. International Transaction Journal of Engineering, Management, & Applied Sciences & Technologies, 5(3), 167–182.

Baker, S., Ponniah, D., & Smith, S. (1999). Survey of Risk Management in Major U.K. Companies. Journal of Professional Issues in Engineering Education and Practice, 125(3), 94–102. https://doi.org/10.1061/(ASCE)1052-3928(1999)125:3(94)

Baloi, D. (2003). Sustainable Construction: Challenges and Opportunities. Association of Researchers in Construction Management, 1(September), 3–5.

Brundtland, G. H. (1987). Our Common Future: Report of the World Commission on Environment and Development. Medicine, Conflict and Survival, 4(1), 300. https://doi.org/10.1080/07488008808408783

Bu-Qammaz, A.S., Dikmen, I., &Birgonul, M.T. (2009). Risk assessment of international construction projects using the analytic network process. Canadian Journal of Civil Engineering, 36(7), 1170–1181. https://doi.org/10.1139/L09-061

Copyright © 2023 ASIAN SCHOLARS NETWORK - All rights reserved

Carew, A.L., & Mitchell, C.A. (2008). Teaching sustainability as a contested concept: capitalizing on variation in engineering educators' conceptions of environmental, social and economic sustainability. Journal of Cleaner Production, 16(1), 105–115. https://doi.org/10.1016/j.jclepro.2006.11.004

Chapman, C., & Ward, S. (2011). How to Manage Project Opportunity and Risk. In OCLC Systems Services (Vol. 22, Issue 4). http://eprints.soton.ac.uk/35673/

Ciancio, D., Jaquin, P., & Walker, P. (2013). Advances on the assessment of soil suitability for rammed earth. Construction and Building Materials, 42, 40–47. https://doi.org/10.1016/j.conbuildmat.2012.12.049

Cooper, D. R., & Schindler, P. S. (2006). Business research methods. In McGraw-Hill (11th ed.). McGraw-Hill.

COSO. (2004). Enterprise Risk Management - Integrated Framework: Executive Summary. In New York (Vol. 3, Issue September). https://doi.org/10.1504/IJISM.2007.013372

Costa, C.S., Rocha, F., & Velosa, A.L. (2016). Sustainability in earthen heritage conservation. Geological Society, London, Special Publications, 416(1), 91–100. https://doi.org/10.1144/SP416.22

Dallas, M. (2013). Management of risk: Guidance for practitioners and the international standard on risk management, ISO 31000:2009 (Issue April).

Falceto, J.C., Mazarrón, F.R., & Cañas, I. (2012). Assessment of compressed earth blocks made in Spain: International durability tests. Construction and Building Materials, 37, 738–745. https://doi.org/10.1016/j.conbuildmat.2012.08.019

Firmenich, J. (2017). Customisable framework for project risk management. Construction Innovation, 17(1), 68–89. https://doi.org/10.1108/CI-04-2015-0022

Garbababa, Y. (2014). Risk Identification and Assessment in Housing Development Projects Using Analytical Hierarchical Process. AHMADU BELLO UNIVERSITY, ZARIA.

Giama, E., & Papadopoulos, A.M. (2012). Sustainable building management: overview of certification schemes and standards. Advances in Building Energy Research, 6(2), 242–258. https://doi.org/10.1080/17512549.2012.740905

Gjerdum, D. (2015). Risk Management's Standard of Practice – An Overview of ISO 31000 (Issue June). Arthur J. Gallagher & Co.

Gupta, D., Sharma, M., & Shankar Trivedi, D. (2016). Risk Management: Identifying Key Risks in Construction Projects. International Journal of Civil and Structural Engineering Research ISSN, 4(1), 2348–76079.

Hamard, E., Cazacliu, B., Razakamanantsoa, A., & Morel, J.-C. (2016). Cob, a vernacular earth construction process in the context of modern sustainable building. Building and Environment, 106, 103–119. https://doi.org/10.1016/j.buildenv.2016.06.009

Hassan, O.A.B. (2016). An integrated approach to assessing the sustainability of buildings. Journal of Engineering, Design and Technology, 14(4), 835–850. https://doi.org/10.1108/JEDT-12-2014-0077

Hopkin, P. (2010). Fundamentals of Risk Management: Understanding, evaluating and implementing effective risk management. Kogan Page Limited.

Hwang, B., Shan, M., & Supa'at, N. N. B. (2017). Green commercial building projects in Singapore: Critical risk factors and mitigation measures. Sustainable Cities and Society, 30, 237–247. https://doi.org/10.1016/j.scs.2017.01.020

Ihuah, P. W., Kakulu, I. I., & Eaton, D. (2014). A review of Critical Project Management Success Factors (CPMSF) for sustainable social housing in Nigeria. International Journal of Sustainable Built Environment, 3(1), 62–71. https://doi.org/10.1016/j.ijsbe.2014.08.001

Illankoon, I.M.C.S., Tam, V.W.Y., & Le, K.N. (2016). Environmental, Economic, and Social Parameters in International Green Building Rating Tools. Journal of Professional

Copyright © 2023 ASIAN SCHOLARS NETWORK - All rights reserved

Issues in Engineering Education and Practice, 143(2), 05016010. https://doi.org/10.1061/(ASCE)EI.1943-5541.0000313

Iqbal, S., Choudhry, R.M., Holschemacher, K., Ali, A., & Tamošaitienė, J. (2015). Risk management in construction projects. Technological and Economic Development of Economy, 21(1), 65–78. https://doi.org/10.3846/20294913.2014.994582

Ishak, S. (2015). The Relationship Between Risk Management Committee Characteristics and Modified Audit Opinion in Malaysia [DOCTOR OF PHILOSOPHY]. UNIVERSITI UTARA MALAYSIA.

ISO. (2015). Moving from ISO 9001:2008 to ISO 9001:2015. http://www.iso.org/iso/iso_9001_-_moving_from_2008_to_2015.pdf

ISO 31000. (2009). Risk management Principles and Guidelines. In Risk Management.

Jarkas, A.M., & Haupt, T.C. (2015). Major construction risk factors considered by general contractors in Qatar. Journal of Engineering, Design and Technology, 13(1), 165–194. https://doi.org/10.1108/JEDT-03-2014-0012

Karim, N.A.A., Rahman, I.A., Memmon, A.H., Jamil, N., & Azis, A.A. Abd. (2012). Significant risk factors in construction projects: Contractor's perception. 2012 IEEE Colloquium on Humanities, Science and Engineering, Chuser, 347–350. https://doi.org/10.1109/CHUSER.2012.6504337

Lehtiranta, L. (2011). Relational Risk Management in Construction Projects: Modeling the Complexity. Leadership and Management in Engineering, 11(2), 141–154. https://doi.org/10.1061/(ASCE)LM.1943-5630.0000114

Leitch, M. (2010). ISO 31000:2009 - The new international standard on risk management: Perspective. Risk Analysis, 30(6), 887–892. https://doi.org/10.1111/j.1539-6924.2010.01397.x

Loosemore, M., Raftery, J., Reilly, C., & Higgon, D. (2006). Risk Management in Projects (Second). Taylor & Francis. http://www.amazon.co.uk/Risk-Management-Projects-Martin-Loosemore/dp/0415260566

Lundqvist, S.A. (2014). An Exploratory Study of Enterprise Risk Management. Journal of Accounting, Auditing & Finance, 29(3), 393–429. https://doi.org/10.1177/0148558X14535780

Manab, N.A. (2009). Enterprise-Wide Risk Management (EWRM) implementation, compliance and value creation among Public Listed Companies (PLCs) in Malaysia [PhD thesis]. UniversitiTeknologi MARA.

Martens, M.L., & Carvalho, M.M. (2016). The challenge of introducing sustainability into project management function: multiple-case studies. Journal of Cleaner Production, 117, 29–40. https://doi.org/10.1016/j.jclepro.2015.12.039

Mileto, C., Vegas, F., Soriano, L., & Cristini, V. (2014). Earthen Architecture: Past, Present and Future (C. Mileto, F. Vegas, L. Soriano, & V. Cristini, Eds.). CRC Press. https://doi.org/10.1201/b17392

Monetti, E., Silva, S.A.R., & Rocha, R.M. (2006). The Practice of Project Risk Management in Government Projects: a Case Study in São Paulo City . Construction in Developing Countries: New Issues and Challenges, January 1–9.

Moraru, R. I. (2012). Risk management for the future: Theory and Cases. https://doi.org/10.5772/1809

Otobo, O.O. (2016). Risk Management System to Guide Building Construction Projects in Developing Countries: A Case Study of Nigeria (Issue February) [PhD Thesis]. University of Wolverhampton.

Pacheco-Torgal, F., & Jalali, S. (2012). Earth construction: Lessons from the past for future eco-efficient construction. Construction and Building Materials, 29, 512–519. https://doi.org/10.1016/j.conbuildmat.2011.10.054

Copyright © 2023 ASIAN SCHOLARS NETWORK - All rights reserved

Petzet, M., & Koenigs, W. (2015). Yemen – Heritage at Risk!.Heritage at Risk, 195–198. https://doi.org/http://dx.doi.org/10.11588/hr.2000.0.22520

PMI. (2017). A guide to the project management body of knowledge (PMBOK® guide) (Sixth). Project Management Institute (PMI).

Pritchard, C.L. (2015). Risk Management: Concepts and Guidance (Fifth). Taylor & Francis Group. www.crcpress.com

Purdy, G. (2010). ISO 31000:2009 - Setting a new standard for risk management: Perspective. Risk Analysis, 30(6), 881–886. https://doi.org/10.1111/j.1539-6924.2010.01442.x

Raz, T., & Hillson, D. (2005). A Comparative Review of Risk Management Standards. Risk Management, 7(4), 53–66. https://doi.org/10.1057/palgrave.rm.8240227

Said, H., & Berger, L. (2014). Future Trends of Sustainability Design and Analysis in Construction Industry and Academia. Practice Periodical on Structural Design and Construction, 19(1), 77–88. https://doi.org/10.1061/(ASCE)SC.1943-5576.0000181

Schmit, J.T., & Roth, K. (1990). Cost Effectiveness of Risk Management Practices. The Journal of Risk and Insurance, 57(3), 455. https://doi.org/10.2307/252842

Schroeder, H. (2016). Sustainable Building with Earth. Springer International Publishing. https://doi.org/10.1007/978-3-319-19491-2

Serpell, A., Ferrada, X., Rubio, L., & Arauzo, S. (2015). Evaluating Risk Management Practices in Construction Organizations. Procedia - Social and Behavioral Sciences, 194(October 2014), 201–210. https://doi.org/10.1016/j.sbspro.2015.06.135

Sharma, S.K., & Swain, N. (2011). Risk Management in Construction Projects. Asia Pacific Business Review, 7(3), 107–120. https://doi.org/10.1177/097324701100700310

Siegel, P.B., &Alwang, J. (1999). An Asset-Based Approach to Social Risk Management : A Conceptual Framework (Issue 9926).

Silvius, G., & Schipper, R.P.J. (2014). Sustainability in project management: A literature review and impact analysis. Social Business, 4(1), 63–96. https://doi.org/10.1362/204440814X13948909253866

Svensson, G., & Wagner, B. (2015). Implementing and managing economic, social and environmental efforts of business sustainability. Management of Environmental Quality: An International Journal, 26(2), 195–213. https://doi.org/10.1108/MEQ-09-2013-0099

Tah, J.H.M., & Carr, V. (2001). Knowledge-Based Approach to Construction Project Risk Management. Journal of Computing in Civil Engineering, 15(3), 170–177. https://doi.org/10.1061/(ASCE)0887-3801(2001)15:3(170)

Teller, J., & Kock, A. (2013). An empirical investigation on how portfolio risk management influences project portfolio success. International Journal of Project Management, 31(6), 817–829. https://doi.org/10.1016/j.ijproman.2012.11.012

Uher, T.E., & Toakley, A.R. (1999). Risk management in the conceptual phase of a project. International Journal of Project Management, 17(3), 161–169. https://doi.org/10.1016/S0263-7863(98)00024-6

Vos, R.O. (2007). Defining sustainability: a conceptual orientation. Journal of Chemical Technology & Biotechnology, 82(4), 334–339. https://doi.org/10.1002/jctb.1675

Wang, S.Q., Dulaimi, M.F., & Aguria, M.Y. (2004). Risk management framework for construction projects in developing countries. Construction Management and Economics, 22(3), 237–252. https://doi.org/10.1080/0144619032000124689

Willumsen, P., Oehmen, J., Stingl, V., & Geraldi, J. (2019). Value creation through project risk management. International Journal of Project Management, 37(5), 731–749. https://doi.org/10.1016/j.ijproman.2019.01.007

Copyright © 2023 ASIAN SCHOLARS NETWORK - All rights reserved

Phu, T.Q. (2017). Enterprise Risk Management Implementation : The Critical Success Factors For Vietnamese Construction Companies. Journal of Multidisciplinary Engineering Science Studies, 3(2): 1365–1379.

Copyright © 2023 ASIAN SCHOLARS NETWORK - All rights reserved