Exploring Critical Success Factors for Enterprise Risk Management in Chinese Construction Firms

Xianbo Zhao[1], Bon-Gang Hwang[2], Sui Pheng Low[3],

Abstract

Enterprise risk management (ERM) has been widely used in various industries and construction firms have been recognized as the prime candidates for ERM implementation. This study aims to identify Critical Success Factors (CSFs) for ERM in Chinese construction firms. To achieve this objective, a total of 16 CSFs were identified through a comprehensive literature review and a questionnaire survey with 89 responses was conducted to collect the perceived importance of these CSFs. The survey results implied that all the 16 CSFs were significantly important. The top six important CSFs were "commitment of the board and senior management", "risk identification, analysis and response", "objective setting", "ERM ownership", "integration of ERM into business processes" and "sufficient resources". In addition, although there were significant differences in the importance of a couple of CSFs between different groups, all the respondents agreed on the CSF ranking, regardless of their institution type and work experience. The CSFs identified in this study would help construction firms to prepare their customized list of CSFs and to better understand the key areas of ERM implementation, significantly contributing to the global body of knowledge relating to ERM.

Keywords: Success factors; Enterprise risk management; Construction firms

1. Introduction

In construction firms, risk management should cover not just project risks, but also the risks faced by being an enterprise (Schaufelberger, 2009). Hence, construction firms should adopt a holistic approach to collectively consider the risks that projects face and to link these events to the corporate strategy (Adibi, 2007). As a holistic approach, enterprise risk management (ERM) has been promoted in various industries. The Committee of Sponsoring Organizations of the Treadway Commission (COSO, 2004, pp2) defines ERM as "a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives." In the construction industry, ERM

[1] Ph.D Candidate; Department of Building; National University of Singapore; 4 Architecture Drive, Singapore 117566; zhaoxb1984@gmail.com.
[2] Assistant Professor; Department of Building; National University of Singapore; 4 Architecture Drive, Singapore 117566; bdghbg@nus.edu.sg.
[3] Professor; Department of Building; National University of Singapore; 4 Architecture Drive, Singapore 117566; bdglowsp@nus.edu.sg.

was forecasted to grow (Deloitte, 2010) and construction firms were recognized as prime candidates for ERM adoption (Druml, 2009).

Successful ERM programs could bring about benefits, such as improved financial stability, improved decision-making, increased management accountability, competitive advantages, better resource allocation, and improved control on projects (Gates, 2006, Liu et al., 2011, Zhao et al., 2012). These benefits were believed to far outweigh the costs of ERM initiation (Hallowell et al., 2012). To ensure the ERM success and the achievement of the benefits, Critical Success Factors (CSFs) for ERM should be identified. The term CSF defines the key activities in which favourable results are absolutely necessary for a particular manager to reach his or her goals (Rockart, 1982).

The objectives of this study are: (1) to investigate the CSFs for ERM in Chinese construction firms; and (2) to identify the differences in the relative importance and ranking of the CSF between different respondent groups. The identification of CSFs enables the management to understand the essential areas for ERM success and to take necessary steps to strengthen these critical areas represented by the top CSFs. In addition, the CSFs identified from the literature review in this study would help construction firms to prepare their customized list of CSFs for ERM and to gain an in-depth understanding of the key areas for ERM success.

2. Literature Review

As there have been few studies on ERM implementation in construction firms, this study reviews the literatures related to ERM in other industries to identify the CSFs for ERM. Some literatures presented successful ERM case studies while others explored the critical factors facilitating successful ERM implementation. In addition, some organizations, such as the COSO and the Casualty Actuarial Society (CAS), have developed ERM frameworks to facilitate ERM implementation in various industries. Thus, a total of 16 CSFs were identified through the comprehensive literature review and are described in the following paragraphs.

CSF01 Commitment of the board and senior management: Commitment of the board and senior management is recognized as a critical success factor (Sharman, 2002, Ward, 2006) because such commitment is also an internal force that drives ERM implementation within a company. Visible commitment makes employees perceive ERM as a priority for the leadership and is essential for organizational buy-in, aligning risk strategy with organizational objectives and incorporating a risk-based approach at the planning and strategy stages (Sharman, 2002). More importantly, the commitment should not be interrupted by changes in the ERM champion because ERM practice is an on-going process (Bowling and Rieger, 2005, Simkins, 2008)

CSF02 ERM ownership: A company should have an ERM owner to centralize risk management and take charge of risk oversight (Banham, 2004). A chief risk officer (CRO) position can be created to take responsibility for ERM, and thus signals the firm's emphasis on risk management to its employees and investors (Cendrowski and Mair, 2009). Alternatively, the ERM owner can be a dedicated senior executive, a stand-alone department, or a board-level risk committee (Zhao et al., 2012).

CSF03 Risk appetite and tolerance: Risk appetite is the “amount and type of risk that an organization is willing to pursue and retain”, while risk tolerance is an “organization's or stakeholder's readiness to bear the risk after risk response in order to achieve its objectives” (ISO, 2009, pp9). Risk appetite, which is established by management with oversight of the board of directors, relates primarily to the business model and is a guidepost in strategy setting, while risk tolerance relates primarily to the organization’s objectives and is tactical (COSO, 2004, Protiviti, 2006). Operating within risk tolerance provides management with greater assurance that the company is within the risk appetite, which, in turn, produces a higher degree of comfort that the company will achieve its objectives (COSO, 2004).

CSF04 Risk-aware culture: Nothing is more crucial to the ERM success in an organization than a supportive culture (Brooks, 2010, Cendrowski and Mair, 2009), which is called a risk-aware culture (Brooks, 2010, Protiviti, 2006), risk management culture (Santori et al., 2007), or risk culture (Collier, 2009, Zou et al., 2010) in the existing literature relating to ERM. Previous studies indicated that risk-aware culture was a success factor for ERM implementation (Ward, 2006). A risk-aware culture requires the buy-in of organizational individuals at all levels (Hopkin, 2010) and embedment into the corporate culture (AON, 2010). In addition, risk awareness should be integrated into the decision-making process (AON, 2010, Santori et al., 2007), especially into the strategic decision-making process.

CSF05 Sufficient resources: Resources, such as funds, qualified staff, time, knowledge and expertise, are necessary for ERM implementation in construction firms. Resources should also be consistently allocated for improving the risk management process, tools, techniques, and personnel skills (Zou et al., 2010). Thus, ERM implementation can be maintained at a high level. In addition, resources should be allocated and distributed for risk response based on the results of risk analysis (Aabo et al., 2005, RIMS, 2008).

CSF06 Risk identification, analysis and response: Management needs to identify all categories of potential risks from internal and external sources that the enterprise faces. Risk analysis techniques help management prioritize the risks identified and identify the key ones. Thus, a corporate risk profile, which is “a periodic documentation of key risks to an organization to achieving its stated objectives over a specific future time” (Fraser, 2010, pp171), can be formed. It can be a list of top risks or a risk map, which has been used in successful ERM cases (Aabo et al., 2005). The appropriate risk response measures are then identified, considering their significance in terms of likelihood and impact.

CSF07 Iterative and dynamic ERM steps: An ERM process encompasses monitoring and review, risk identification, risk analysis, risk evaluation and risk response. The iterative and repetitive steps comprise a continuous improvement cycle. Such an ERM process also involves monitoring, identifying and assessing new risks that may emerge following changes in the environment (AON, Dafikpaku, 2011, Garvey, 2008, Santori et al., 2007), thus enabling an enterprise to deal with risks in a proactive way and to update its risk profile.

CSF08 Leveraging risks as opportunities: Sharman (2002) argued that emphasizing upside opportunities as well as downside threats was a success factor for ERM. In addition to focusing on dealing with downside risks (threats), ERM also involves leveraging and

exploiting the upside risks (opportunities) for competitive advantages (Banham, 2004, COSO, 2004, Dafikpaku, 2011, Pagach and Warr, 2010). Opportunities exist where a risk is more dangerous to competitors, or where an enterprise has a greater ability to manage the risk than its competitors (Berry and Phillips, 1998). The more an enterprise understands its risk landscape, the more it can leverage opportunities (AON, 2010).

CSF09 Risk communication: To be successful, ERM should have proper communication flow between the management staff and the risk management function (Kleffner et al., 2003). Relevant and reliable risk information obtained from various sources should be communicated transparently across multiple projects and departments of a construction firm. Such transparent risk communication encourages individual comments and expert views during the development of risk management strategies and cross-functional understanding of risks (AON, 2010). In addition, a mechanism should be set up to ensure that critical risk information is reported to the board and senior management (Dafikpaku, 2011) and that line managers, project managers and staff are promptly notified of critical information and decisions (Barton et al., 2002).

CSF10 A common risk language: A common risk language, which explains the terminologies and methodologies and contributes to a common understanding of their meanings and context throughout the enterprise, is viewed as a key quality of an effective ERM program (Duckert, 2011) and an imperative for successful ERM deployment (IMA, 2006). This is because such a risk language underpins risk culture, facilitates risk communication, cut through the layers and breaks down the silos (Espersen, 2007).

CSF11 A risk management information system (RMIS): Information and communication technology (ICT) plays a key role in enabling the flow of information across an enterprise (Dafikpaku, 2011). A RMIS serves as a platform for risk communication and reporting, records risk management activities, or even undertakes risk identification and analysis and provides response plans. Staff should be clear about the application of the RMIS, thus ensuring that the functions are fully used.

CSF12 Training programs: To succeed in implementing ERM, it is critical that staff at all levels throughout an enterprise accept ERM adoption (Kleffner et al., 2003, Nocco and Stulz, 2006). Thus, training programs are critical to ERM success (IMA, 2006, KPMG, 2010). Training programs can be used to reduce misunderstanding and anxiety about ERM, and help staff clearly understand the ERM philosophy and policy, the ERM process, and the value of ERM. Through such programs, employees recognize that ERM is not a quick process but a multi-year journey (Bowling and Rieger, 2005).

CSF13 Formalized key risk indicators (KRIs): A KRI is “a measure to indicate the potential, presence, level, or trend of a risk” (Hwang, 2010: p.126). KRIs should be identified for all the risks that a firm faces and should be periodically analysed by risk owners (RIMS, 2008). In addition, KRIs help monitor risks and involve predetermined thresholds for each KRI that will trigger actions by management to adjust its strategies proactively to manage the risks accordingly (Beasley et al., 2010). Thus, well-defined KRIs were critical to successful ERM programs (Duckert, 2011).

CSF14 Integration of ERM into business processes: To be successful, ERM should be fully integrated into the management and business processes of an enterprise (COSO, 2004). These processes include decision-making and strategic planning. In all decision-making processes, the risks identified should be consistently considered, and emerging risks should also be anticipated. In addition, full integration of ERM is not easy and time-consuming. In large companies, full integration would take from three to five years once ERM is initiated because of delays in moving level by level and the need for change management to overcome inertia (Shortreed, 2010).

CSF15 Objective setting: ISO 31000:2009 defined risk as “effect of uncertainty on objectives” (pp1). Thus, risk is linked with objective setting. Objective setting is one of the eight components of the COSO ERM framework, and is seen as a precondition to risk identification, risk assessment and risk response (COSO, 2004). Hence, corporate objectives should be clearly identified. All objectives should have performance measures and all performance measures should be linked with objectives.

CSF16 Monitoring, review and improvement of ERM framework: On-going monitoring and review of the ERM framework are necessary to ensure that ERM is effective and continuously supports organizational performance (Ward, 2006). According to ISO 31000:2009, management should periodically measure progress against the risk management plan, and review whether the risk management framework, policy and plan are still appropriate. Considering the results of monitoring and reviews, decisions should be made on how the ERM framework, policy and plan can be improved.

3. Methodology and Data Presentation

Table 1: Profile of respondents

Characteristics	Categorization	Industry (N=64)		Academia (N=25)		Overall (N=89)	
		N	%	N	%	N	%
Work experience	5-10 years	40	62.5%	3	12.0%	43	48.3%
	11-15 years	8	12.5%	6	24.0%	14	15.7%
	16-20 years	7	10.9%	9	36.0%	16	18.0%
	21-25 years	4	6.3%	4	16.0%	8	9.0%
	Over 25 years	5	7.8%	3	12.0%	8	9.0%
Title	Professor	—	—	11	44.0%	11	12.4%
	Associate Professor	—	—	14	56.0%	14	15.7%
	Senior management	14	21.9%	—	—	14	15.7%
	Department management	12	18.8%	—	—	12	13.5%
	Project management	38	59.4%	—	—	38	42.7%
Location	China	37	57.8%	25	100%	62	69.7%
	Asia (without China)	12	18.8%	—	—	12	13.5%
	Africa	11	17.2%	—	—	11	12.4%
	Europe	2	3.1%	—	—	2	2.2%
	Latin America	2	3.1%	—	—	2	2.2%

A questionnaire survey was conducted to collect the importance of the CSFs for ERM from Chinese construction firms. In this study, the target sample consisted of the senior and middle management in Chinese construction firms and the academics with in-depth knowledge of risk management in these firms through research. Based on the comments from the pilot study, revisions were made to improve the readability and accuracy of the

description of the CSFs. In the finalized questionnaire, the respondents were asked to provide their general information and to rate the importance of the 16 CSFs according to a five-point scale (1=very low, 2=low, 3=medium, 4=high, 5=very high).

A total of 390 questionnaires were sent, and 89 completed questionnaires were obtained from 25 academics and 64 practitioners, representing a response rate of 22.8%. The respondent profile is indicated in Table 1. 51.7% of the respondents had over 10 years of experience, ensuring the response quality. In addition, responses were collected from the domestic and overseas subsidiaries Chinese construction firms, thus representing the views of Chinese construction firms in the global construction market.

4. Data Analysis and Discussions

4.1 Overall Importance of the CSFs

The Cronbach's alpha coefficient of 0.920 suggested that the data of the importance of the CSFs had high reliability. Table 2 reports that the importance mean scores of the CSFs range from 3.40 to 4.55. The one-sample t-test was performed to test whether each CSF was significantly important. The p-values of all the CSFs were 0.000, suggesting that all the CSFs had significant importance. A total of six CSFs obtained overall importance mean scores over 4.00.

Table 2: Overall ranking of the CSFs for ERM

Code	CSFs for ERM	Mean	Rank	p-value
CSF01	Commitment of the board and senior management	4.55	1	0.000*
CSF02	ERM ownership	4.16	4	0.000*
CSF03	Risk appetite and tolerance	3.51	15	0.000*
CSF04	Risk-aware culture	3.82	12	0.000*
CSF05	Sufficient resources	4.01	6	0.000*
CSF06	Risk identification, analysis and response	4.28	2	0.000*
CSF07	Iterative and dynamic ERM steps	3.97	8	0.000*
CSF08	Leveraging risks as opportunities	3.61	14	0.000*
CSF09	Risk communication	3.90	10	0.000*
CSF10	A common risk language	3.40	16	0.000*
CSF11	A risk management information system	3.76	13	0.000*
CSF12	Training programs	3.92	9	0.000*
CSF13	Formalized key risk indicators	3.89	11	0.000*
CSF14	Integration of ERM into business processes	4.08	5	0.000*
CSF15	Objective setting	4.26	3	0.000*
CSF16	Monitoring, review and improvement of ERM framework	3.97	8	0.000*

*The one-sample t-test result was significant at the 0.05 level (two-tailed).

"Commitment of the board and senior management" was ranked first, suggesting that the support from the top management was the most important. In Chinese construction firms, the attitude of the top management towards ERM determines whether ERM implementation is successful or not. This is because the management hierarchy is clear in these firms and the subordinates follow their superiors in most cases. In addition, the result echoed the findings of Gates (2006) and Kleffner et al. (2003) that the commitment of the board and senior management was an internal driver for ERM implementation.

“Risk identification, analysis and response” obtained the second position, implying that Chinese construction firms attached great importance to the actual execution of ERM because this CSF describes the critical steps of a generic risk management process. In addition, the high mean score of this CSF confirmed the validity of the COSO ERM framework (COSO, 2004) because this CSF can reflect three components of this framework, i.e. event identification, risk assessment, risk response.

The third ranked CSF was “objective setting”, indicating that clearly identified objectives at various levels were highly important to ERM success in Chinese construction firms. Objective setting also involves clearly identifying strategic objectives (Bowling and Rieger, 2005) because ERM should be applied in strategy setting (COSO, 2004). The result also confirmed the validity of the COSO ERM framework because objective setting is one of the eight components of this framework.

“ERM ownership” was the fourth important CSF. This result suggested that successful ERM programs in Chinese construction firms needed an owner to centralize risk management and to take charge of risk oversight, which was consistent with the ERM practices in other industries (Banham, 2004). According to a case study relating to a Singapore subsidiary of a leading Chinese construction firm (Zhao et al., 2012), the ERM responsibility was included in the function of the Managing Director while the board of director itself served as a risk committee.

The fifth ranked CSF was “integration of ERM into business processes”. This result echoed the ERM Guidance for Central Enterprise issued by the State-owned Assets Supervision and Administration Commission of China’s central government (SASAC, 2006), which stipulates that ERM should be fully integrated into the management and business processes of an enterprise. Central enterprises are the state-owned enterprises administered by the SASAC with the authority vested by China’s central government. Most leading Chinese construction firms are central enterprises that need to comply with the guidance and this CSF has been recognized as a key performance indicator of ERM implementation by the SASAC.

Another highly ranked CSF was “sufficient resources”, implying resources (e.g., funds, qualified staff, time, knowledge and expertise) were inevitable and necessary for ERM implementation in Chinese construction firms. Thus, resources should be consistently allocated to ERM programs to assure their success. By contrast, previous studies identified insufficient inputs of time, fund and staff, and lack of internal knowledge and expertise as hindrances to ERM implementation (Gates, 2006, Rao, 2007).

4.2 Importance of the CSFs by Respondent Characteristics

This study also investigates the differences in CSF importance between different groups of respondents to check whether there was consensus on the top CSFs. Meanwhile, possible reasons were provided to highlight the different viewpoints on the CSFs with statistical differences in their importance. Table 3 reports the importance mean scores and ranks of the CSFs by institution types and work experience.

According to the institution type, the respondents were grouped into practitioners and academics. The independent-sample t-test results showed significant differences in the importance mean scores of three CSFs between the two groups (see Table 3). Although the practitioners and academics assigned significantly different scores to “commitment of the board and senior management” and “risk identification, analysis and response”, the mean scores were high and both CSFs were among the top three CSFs of each group. However, “integration of ERM into business processes” obtained great differences in both mean scores and ranks between the two groups. The practitioners ranked it ninth while the academics ranked it third. Because the full integration of ERM is not easy and time-consuming (Shortreed, 2010), practitioners did not think it very important when they initiated ERM. From the pragmatic perspective, at the early stage of ERM implementation, management needs short-term wins to convince employees that ERM can create value and benefits for the company. Obtaining continuous support from the top management and employees, ERM can be implemented across the company and integrated into the business processes. By contrast, the academics would emphasize the full integration of ERM as this has been emphasized in existing ERM frameworks or guidance (e.g. COSO, 2004, SASAC, 2006).

Table 3: Ranking of the CSFs for ERM by institution type and work experience

CSF code	Institution type					Work experience							
	Industry (N=64)		Academia (N=25)		p-value	5-10 yrs. (N=43)		11-20 yrs. (N=30)		> 21 yrs. (N=16)		ANOVA	
	Mean	Rank	Mean	Rank		Mean	Rank	Mean	Rank	Mean	Rank	p-value	Post-hoc
CSF01	4.47	1	4.76	1	0.028*	4.42	1	4.77	1	4.50	1	0.111	NSD.[a]
CSF02	4.13	4	4.24	5	0.570	4.16	3	4.20	7	4.06	5	0.874	NSD.
CSF03	3.56	15	3.36	15	0.318	3.51	15	3.53	14	3.44	16	0.936	NSD.
CSF04	3.78	13	3.92	10	0.543	3.79	12	4.03	10	3.50	15	0.193	NSD.
CSF05	3.95	6	4.16	6	0.317	3.95	5	4.23	5	3.75	12	0.169	NSD.
CSF06	4.17	3	4.56	2	0.025*	4.07	4	4.60	2	4.25	3	0.009**	G1<G2 [b]
CSF07	3.95	6	4.00	8	0.816	3.86	9	4.20	7	3.81	11	0.175	NSD.
CSF08	3.63	14	3.56	14	0.779	3.63	14	3.53	14	3.69	13	0.863	NSD.
CSF09	3.92	9	3.84	12	0.700	3.93	6	3.87	12	3.88	10	0.951	NSD.
CSF10	3.48	16	3.20	16	0.212	3.40	16	3.37	16	3.50	15	0.903	NSD.
CSF11	3.83	12	3.60	13	0.342	3.81	11	3.53	14	4.06	5	0.219	NSD.
CSF12	3.95	6	3.84	12	0.623	3.88	8	3.97	11	3.94	8	0.936	NSD.
CSF13	3.88	11	3.92	10	0.833	3.77	13	4.03	10	3.94	8	0.452	NSD.
CSF14	3.92	9	4.48	3	0.015*	3.81	11	4.33	4	4.31	2	0.046**	G1<G2 [b]
CSF15	4.20	2	4.40	4	0.319	4.19	2	4.47	3	4.06	5	0.216	NSD.
CSF16	3.92	9	4.08	7	0.438	3.88	8	4.10	8	3.94	8	0.570	NSD.

* The independent-sample t-test result is significant at the 0.05 level (two-tailed); ** The one-way ANOVA result was significant at the 0.05 level (two-tailed); [a] NSD.= No significant difference; [b] G1=5-10 yrs; G2=11-20 yrs.

In addition, according to the work experience, the respondents were divided into three groups, i.e. respondents with 5-10 years (G1), 11-20 years (G2) and over 21 years (G3) of experience, respectively. The one-way analysis of variance (ANOVA) results suggested that the three groups had differences in the importance mean scores of two CSFs: “risk identification, analysis and response” and “integration of ERM into business processes”. The least significant difference (LSD) test was adopted as the post-hoc test because it has more power than other methods (e.g. Tukey test) (Williams and Abdi, 2010). The LSD test results indicated that the G2 respondents attached more importance to these two CSFs than the G1 ones, and that there were no significant differences between G1 and G3 and between G2

and G3. In terms of “risk identification, analysis and response”, although the G1 respondents rated it significantly less than the G2 ones, all the three groups considered that “risk identification, analysis and response” was very important (mean>4.00) and ranked it among the top five CSFs. However, as for “integration of ERM into business processes”, the G1 respondents ranked it very low, suggesting that this CSF did not attract adequate attention from the ones with less experience. This is possibly because this CSF involves a long-term view on ERM implementation and the staff with less experience did not have such a long-term view. More experienced ones would hold a long-term view on ERM and understand that integration of ERM into business processes can bring about more benefits.

In case of the CSF ranking, all the groups ranked “commitment of the board and senior management” first, thus confirming its top position in the overall ranking. The Spearman rank correlation was performed and the result indicated strong correlation between the practitioners and academics (see Table 4). Thus, the two groups agreed on the CSF ranking. In addition, there were significant correlations among the G1, G2 and G3 respondents, suggesting the agreement on the CSF ranking among these three groups.

Table 4: The Spearman rank correlation

Characteristics		Institution type		Work experience		
		Industry	Academia	5-10 yrs.	11-20 yrs.	> 20 yrs.
Institution type	Industry	1.000	0.849*	——		
	Academia	0.849*	1.000			
Work experience	5-10 yrs.	——		1.000	0.784*	0.672*
	11-20 yrs.			0.784*	1.000	0.689*
	> 20 yrs.			0.672*	0.689*	1.000

* Correlation is significant at the 0.01 level (2-tailed).

5. Conclusions and Recommendations

The study identifies the important CSFs for ERM in Chinese construction firms. A total of 16 CSFs were identified through a comprehensive literature review and a questionnaire survey was conducted to collect the data relating to the relative importance of these CSFs. The analysis results implied that all the 16 CSFs were significant important to ERM success. The top six important CSFs were “commitment of the board and senior management”, “risk identification, analysis and response”, “objective setting”, “ERM ownership”, “integration of ERM into business processes”, and “sufficient resources”. In addition, although there were significant differences in the perceived importance of a couple of CSFs between different groups, all the respondents agreed with the CSF ranking, regardless of their institution type and work experience. Thus, it can be concluded that there was consensus on the top CSFs.

Although the objectives of this study were achieved, there are limitations to the conclusions that may be drawn from the results. First, the CSFs identified in this study were not exhaustive. In addition, as the data were collected from the professionals with experience and knowledge relating to ERM in Chinese construction firms, one should be cautious when the results are interpreted and generalized. Nonetheless, construction firms from other countries can also use the CSFs identified in this study to prepare their customized list of CSFs for ERM. Also, the findings of this study provide valuable information for future studies

related to ERM in the global construction industry. Thus, it is believed that this study contributes to the body of knowledge relating to ERM in the broader global community.

Future studies can develop a set of ERM performance indicators related to the key areas of ERM for performance assessment. In addition, the critical hindrances to ERM implementation in construction firms can be identified, and thus management can take measures to deal with them to guarantee ERM success.

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