The Impact of Risk Management and Knowledge Management on Construction Project Success: The Mediating Role of Project Management Performance

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Abstract

This research seeks to show the importance of risk management (RM, henceforth) and knowledge management (KM, henceforth) for project success (PS) and to investigate the mediating role of project management performance (PMP). Online questionnaire was distributed to 220 project managers among all 200 Jordanian first class construction companies. The data from 165 respondents were checked and coded for statistical analysis using Structural Equation Modeling (SEM) with Analysis of Moment Structures software (AMOS, 20) and Statistical Package for the Social Sciences software (SPSS,20). The results indicated that RM and KM have significant positive effects on PMP and PS. Moreover, PMP was found to have a significant positive effect on PS. The results showed that PMP was the strongest predictor of PS while the strongest predictor of PMP was RM. From the results of mediation analysis, it was found that PMP partially mediates the effects of RM and KM on PS. The study recommended that Jordanian construction companies should consider seriously RM and KM in their projects since they will protect the projects from such failures as completion delay, overrun, low quality or safety incidents. In addition, the construction companies have to pay more attention for project management training and the use of the best practices of project management which will improve the overall organization performance.

Keywords: Knowledge Management, Project Management Performance, Project Success, Risk Management.

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أثر إدارة المخاطر وإدارة المعرفة في نجاح المشاريع الإنشائية: الدور الوسيط لأداء إدارة المشروع

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ملّخص

يسعى هذا البحث إلى إظهار أهمية إدارة المخاطر وإدارة المعرفة لنجاح المشاريع الإنشائية وإلى التحقيق في أثر الدور الوسيط لأداء إدارة المشروع. تم توزيع استبيان عبر الإنترنت على 220 مدير مشروع من بين 200 شركة إنشاءات أردنية من الدرجة الأولـــى. حيث تم فحص البيانات من 165 مستجيبًا وترميزها للتحليل الإحصائي (SEM) و (AMOS) والحزم الإحصائية للعلوم الاجتماعية (SSPS). وقد أشارت النتائج إلى أن إدارة المخاطر وإدارة المعرفة لهما آثار إيجابية كبيرة على أداء إدارة المشاريع ونجاح المشروع. علاوة على ذلك، وجد أن أداء إدارة المشروع له تأثير إيجابي كبير على نجاح المشروع، حيث أظهرت النتائج أن أداء إدارة المشروع كان أقوى مؤشر على نجاح المشروع. في حين أن أقوى مؤشر على أداء إدارة المشروع كان إدارة المخاطر. ومن خلال نتائج تحليلات العامل الوسيط، وجد أن أداء إدارة المشروع يتوسط جزئيًا في تأثيرات إدارة المخاطر وإدارة المعرفة على نجاح المشروع. وقد أوصت الدراسة بأن تنظر شركات الإنشائية الأردنية بجدية في إدارة المخاطر وإدارة المعرفة في مشاريعها حيث أن ذلك سيحمي المشاريع من الفشل مثل تأخير الإنجاز أو تجاوز الميزانية أو انخفاض الجودة أو حوادث السلامة. بالأضافة الى ذلك ينبغي على الشركات الإنشائية أن تزيد من اهتمامها في التدريب على إدارة المشاريع واستخدام أفضل ممارسات إدارة المشاريع والتي من شأنها تحسين الأداء العام للمؤسسة.

الكلمات الدالة: إدارة المعرفة، أداء إدارة المشاريع، نجاح المشروع، إدارة المخاطر.

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|Introduction

The construction project is complicated in its nature because it involves enormous numbers of parties, including consultants, contractors, stakeholders, and owners. Despite this complexity, industry assumes a significant part in the national economies and accomplishment of society's objectives. It is probably one of the biggest businesses, and it adds to about 10% of the gross national product (GNP, henceforth) in industrialized nations (Navon, 2005). With regard to the construction industry, it is the probability of the occurrence of a specific event or compound of events that happen during the entire cycle of the project. Construction projects include many factors, and it is regularly hard to decide circumstances and logical results, reliance and relationships. Thus, those risks assume a critical part in decision making and may influence the performance of a project (Wiguna and Scott, 2005). Time, cost, and quality are the most used three performance evaluation dimensions (Pheng & Chuan, 2006). Samson and Lema (2005) argue that contractors must be able to continue improving their performance for two reasons: i) the growing users' requirements, environmental attention, and restricted resources, and ii) the high rivalry for the construction business market.

The aim of RM in construction projects is essential to achieve the intended results of the projects on the agreed budget and timeframe with the achievement of desired quality according to project specifications and design. The project managers can utilize the risk management system in prioritizing resource allocation and assist them to make a reliable decision, which contributes to achieving the project objectives (Bahamid, Doh, Al-Sharafi & Rahimi, 2020). Thus, this research seeks to show the importance of RM and KM for PS and to investigate the mediating role of PMP.

Literature Review

Risk Management (RM)

Risk is commonly characterized in principle as a positive or negative discrepancy between a variable and its predicted value (Schieg, 2006). The Project Management Institute (PMI, henceforth), the biggest specialized project management association, has described project Risk Management as a structured mechanism to identify, analyze, and respond to project risk. It involves maximizing the likelihood and effects of beneficial events and reducing the possibility and influence of harmful events on performance and

objectives. RM can also be defined as a series of relevant decision-making tasks that may also be specified based on accumulated evidence on circumstances that may or may not exist (Boehm, 1991; Chapman & Ward, 1996).

Efficient RM is a critical factor in the effective management of projects (Reed & Angolia, 2020). Proper RM may help the project manager against all forms of project threats, both identified and unknown. If RM does not function successfully, projects may surpass the cost, fall behind deadline, fail to reach essential performance objectives, or some mixture of those issues (Carbone & Tippett, 2004).

Many scholars believe that the risk identification is the most critical step of the risk process; after the risk is recognized, the control steps can be taken (Marcelino, Pérez, Lazcano & Villanueva, 2014). In general, project systems are risky with several various forms of risks that prohibit them from being adequately defined. Therefore, grouping risks in smaller and more controlled units is essential (Marle, 2002).

Knowledge Management (KM)

The knowledge is a mix of truth, understanding, practice, principles, beliefs, expectations, perspectives, and expert observations that provide the principle of the assessment and integration of new thoughts, materials, and experiences (Davenport and Pruzak, 2001). There are several ways to describe what KM is. Hsu and Shen (2005) define KM as a structured and coordinated method to improve operational capability for the utilization of expertise in decision making, acting, and producing outcomes in favor of the business model, and supporting their plan. Also, one might argue that this is how organizations create, collect and use the information to reach the firm goals (Sommerville & Craig, 2006). Knowledge is a critical tool and must be handled to ensure information acquisition and enhance performance strategies for corporations (Al-Ghassani, Kamara, Anumba & Carrillo, 2006).

Construction is a knowledge-based field (Al-Ghassani et al. 2006), as specialized expert knowledge, technical skills, and trouble solving expertise are required for carrying out construction activities. Given this, the KM is essential for the construction project and will increase the success potential (Serpella et al., 2014). A construction company’s knowledge is acquired primarily by its projects. Therefore, the experiences gained from each of

these projects must be gathered to be utilized on other projects (Maqsood, 2006). The problem is usually in projects; the knowledge produced is typically preserved in papers that few people care about, or are lost when the participants' team members are shifted to a different project, resign or retire (Kivrak et al. 2008), which cause losing competitive advantages for the whole business, and not only their expertise. This is challenging since the actual effects of an intervention in a project can only be reflected in terms of retrospection (Serpella et al., 2014). Thus, a significant benefit is missing, which is a significant factor influencing the financial success of an organization since the methods of storing, communicating, and exchanging information and experience created by individual project teams are inadequate (Wu et al., 2004).

Project Management Performance (PMP)

The Project Management Institute describes project management (PM, henceforth) as the implementation of experience, abilities, resources and procedures to project tasks to fulfil the requirements of the project. PM is carried out by integrated implementation and coordination through all project phases (from initiation to closure). The project manager is responsible for fulfilling the project goals (Unegbu, Yawas, & Dan-asabe, 2020a). The productivity level of the team, the volume of work carried out, timing and budget compliance, work quality, project priorities attainments, and efficient social interactions outside the team are categorized as the measures of PMP (Al-Hajj & Sayers, 2014).

Badewi (2016) claimed that the performance of project management is intended to boost the quality of PM such that the chances of successful completion are improved. The PMP definition requires to be described in terms of its potential advantages. The meanings of PMP are therefore as different depending on the purpose of definition. The emphasis of Kerzner (2017) on the clear company priorities to define and evaluate PMPs amounts to the lack of PM process metrics to calculate performance. The challenge is also the concept of project value (Thomas & Mullaly, 2007), which often renders it challenging to define project performance and how projects can be evaluated (Mir & Pinnington, 2014). Even so, Muller and Jugdev (2012) stated that the success of the project was not well established, but that the creation and execution of measurable structures are required to demonstrate how successful the project is. The efficiency of the project management is calculated by PS as previously proposed in other reviews. In terms of PS,

most studies concentrate on the fast execution, completion of the timeline, compliance of quality requirements, secure completion, and consumer satisfaction (Demirkesen & Ozorhon, 2017).

Procedures and tools of PM, such as planning, implementation, and control, which are based on PM and team leadership abilities, helped to achieve project goals in terms of time, scope, cost, quality and client satisfaction. In three steps, including early start, mid-project and complete project, PMP may utilize various methods to assess how effectively a project meets its goals. Several factors may benefit from PMP effects, including profit, cost reduction, the improvement in the amount of production converted to dollar value and the increased efficiency of each of them. The cost considerations include, among other aspects, costs of the planning, production and maintenance of the program to enhance the project or project management, personnel costs, transport and expenditures, train fares and operating costs (Fernando et al. 2018).

Project Success (PS)

When the project is finished on time, on a budget, and the quality is accepted by all, then it can be regarded as success project (Chan, Scott, & Lam, 2002; Unegbu, Yawas, & Dan-asabe, 2020b).). In terms of expense, scheduling, efficiency and safety, the project may also be described as successful when much better outcomes than predicted or typically are achieved. Also due to many stakeholders involved in today's project climate, the sense of 'success' itself has several adjustments (Chan et al., 2002). The PS, as a concept, is established with requirements and expectations to assist project team in the execution of tasks with the most desired outcomes (Chan & Chan, 2004). There is no consensus about what the basic requirements for the PS should be. When a project meets output objectives and tasks, and when a project is often fully compliant with the standards within the company also with the project team and customers' expectations, it is called a successful (Wit, 1988). Success in meeting cost, time and quality targets is considered as a direct achievement in project management; PS deals with the final project goals (Ramlee et al., 2016).

He et al. (2019) assumed that the project outcomes might be perceived to be a success if they are more significant than sufficient in terms of the project participants' cost, schedule, efficiency, health, and satisfaction. Pinto

and Slevin (1988) estimated that at least four conditions must be fulfilled for successful projects, which are to accomplish all the expected targets and to acknowledge the outcomes by a client, on schedule, and within the budget. Also, PS depends on human elements, including project management, in addition to the three constraints of time, cost and quality (Renault, Agumba, & Ansary, 2020).

The success of the project is not easily achieved. In the last decade, a lot has helped us understand how the project is completed and why it was successful or unsuccessful (Koelmans, 2004). Moreover, many projects are never completed. Even if the primary supporter is happy with the performance, and the primary stakeholders have benefited in some way, while not getting all the initial objectives of a project can still be viewed positively. The significant factors for improvement include a specific description of the target and plan on how to accomplish it, then all who work in such a project want to succeed. The topic of PS is often debated, but there are numerous and diverse theories of what make a successful project (Amoah & Pretorius, 2019).

Each project has distinct and unique stakeholders with their project criteria that evaluate what successful project output is and what a successful project implies (Rad and Ginger, 2002). Each project has its unique specifications. Different individuals can see progress in different respects, even though they are members of the same company (Shrnhur, Levy & Dvir, 1997). The project's progress consists of four factors, namely budget (expenses), time frame (time), efficiency (quality and use), and satisfaction with the consumer, as per Gido and Clements (2014). The key for the performance of a project is the participants, the project team and their organization, the methods and strategies the project team uses, and the team's awareness of the stakeholders' needs and goals as the elements for project performance. These shared requirements, considerations and core problems can be classified collectively.

However, the PS, as per Teresa and Ramírez (2002), is calculated by the capacity to complete the project within the defined budget, within the expected timeline, and with the satisfaction of the customer and stakeholders as per the required specification. If a project is considered a success, the decision is always based on objective facts, but everyone cannot use the same information. While various individuals are using the same metrics and the same set of appraisal indices, they do not agree on the same level to PS (Meredith and Mantel, 2003).

Theoretical Framework

The research structural model was developed in this study. This model is intended to test 5 hypotheses related to direct effects of RM, KM, PMP on PS. The study also examined the mediation effects of PMP on the relationships of the other constructs.

Figure (1) illustrates the hypothesized direct and mediation effects in the research structural model:

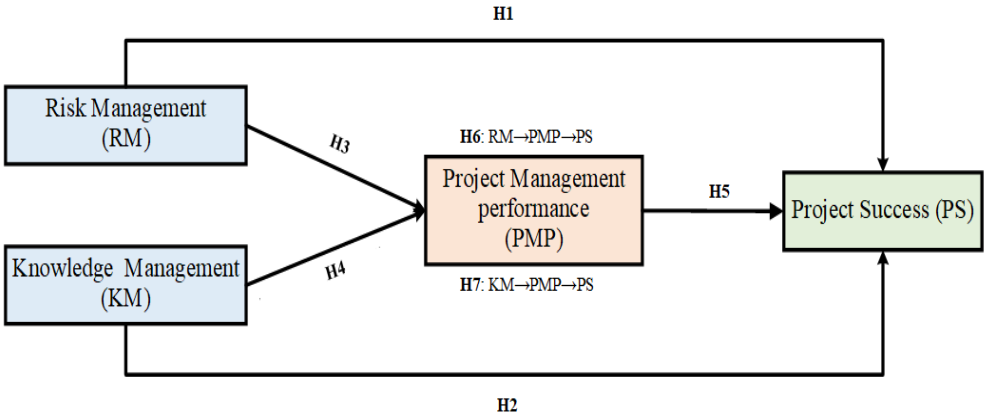

Figure (1)Theoretical Framework (Adopted from: Jiao et al., 2019; Fernando et al., 2018; Nguyen & Watanabe, 2017; Chen & Mohamed, & 2010; Lepmets, 2007).

Research Hypotheses

Risk Management (RM) and Project Success (PS).

There is a positive link between RM and PS. RM decreases the chance of detrimental effect on project completion date. However, RM is possibly dependent on the project manager's specific capacity (Urbański, Haque, Oino, 2019). In comparison, the success of the project is greatly connected to project planning, project RM, and organizational environment according to Naeem, Khanzada, Mubashir and Sohail (2018). The researcher then concluded that:**H1: Risk Management (RM) has positive effect on Project Success (PS)**

Knowledge Management (KM), and Project Success (PS).

Latif et al. (2020) noted that the KM frameworks had a substantial effect on project performance, and the results were in agreement with the previous research (e.g., Yang, Chen & Wang, 2012; Yang, Chen & Lee, 2017). The findings show that the project-based organizations which use the KM framework will increase the chances of a successful project considerably. Tupenaite, Kanapeckiene and Naimaviciene (2008) also observed that KM is a crucial element in the effective execution of construction projects and tasks by partners and institutions Jiao, Saeed, Fu & Wang (2019) also observed that the output of the project portfolio is positively associated with all three forms of knowledge sharing (knowledge sharing within the project, among projects, and among the organization). The researcher believed in this respect:

H2: Knowledge Management (KM) has positive effect on Project Success (PS).

Risk Management (RM) and Project Management Performance (PMP).

Concerning the small construction organizations, there is no definitive proof about the effect of RM on project results as many projects carried out have resulted in accepted project performance indicators that have no unique RM procedures defined before or during implementing the works (Amoah & Pretorius 2019). On the other hand, Alkhlaifat, Abdullah & Magassouba (2019) showed that a significant phase in preventing performance failure, as the impacts of risk factors in project performance vary depending on the severity of RM and the abilities of risk managers, but do not vary from the sophistication of the project. These findings were confirmed by a survey (Wu, Nisar, Kapletia & Prabhakar, 2017), which have shown that successful project RM has a direct connection to the performance of project variables. The researcher then concluded that:

H3: Risk Management (RM) has positive effect on Project Management Performance (PMP).

Knowledge Management (KM) and Project Management Performance (PMP).

KM methods and instruments are primarily used by project managers. The connection between KM and PMP was also demonstrated. Project managers consider the utilization of KM activities to have a beneficial impact on enhancing project management. All in all, the relationships are not too strong, but they are still significant as per Ribière and Lierni (2008). In this context, an important construct that must be taken into account and that can have positive impacts on project management is KM, which has been shown to be important for organizations to differentiate themselves in relation to their competitors (Tomomitsu et al., 2018). Lindner and Wald (2011) highlight that knowledge is an important resource in advanced economies and for many organizations; the effectiveness of knowledge management is one of the main success factors of an organization. The investigator then concluded that:

H4: Knowledge Management (KM) has positive effect on Project Management Performance (PMP).

Project Management Performance (PMP) and Project Success (PS).

Project performance management practices have allowed automotive industries to achieve project targets with regard to their time, expense, scale, efficiency, and consumer preferences (Fernando et al., 2018). Also, Alkhlaifat, Abdullah and Magassouba (2019) argued that the efficiency of project management has a beneficial effect on the success of the project. Badewi (2016) has claimed that the performance of project management is intended to boost the quality of project management such that the chances of successful completion are improved. The researcher believed in this respect:

H5: Project Management Performance (PMP) has positive effect on Project Success (PS).

Risk Management (RM), Project Management Performance (PMP), and Project Success (PS).

Fernando et al. (2018) also verified RM's beneficial connection to the PMP. The project leader's capacity to handle risk not only increases the success of a project as expected but also guarantees that a project with other effected people is structured to minimize additional risks and to include the use of unsafe raw resources and unrequired additional cost. Besides, Alkhlaifat, Abdullah & Magassouba, (2019) deduced that the successful

projects are affected significantly by PMP, organizational culture, and project RM. The investigator then concluded that:

H6: Project Management Performance (PMP) mediates the relationship between Risk Management (RM) and Project Success (PS).

Knowledge Management (KM), Project Management performance (PMP), and Project Success (PS).

Each corporation needs to use project management to provide its goods and services to its clients and consumers with the best performance and advantages. If knowledge management is efficient, the business will turn the company into excellence (Levin, 2010). In addition to the above, Yeong and Lim, (2011) proposed that the PS could be greatly influenced both by KM variables and by project management elements. Thus, the researcher assumed that:

H7: Project Management Performance (PMP) mediates the relationship between Knowledge Management (KM) and Project Success (PS).

Research Methodology

Research Design

The research design is a data collection, interpretation, and evaluation plan built to address the research questions (Sekaran & Bougie, 2016). The design of the research provides the measures needed to respond to the research topic and to evaluate the theory suggested (Silver & Stevens, 2012). A survey for a chosen group of construction project managers was used during this study. Data for the study variable was spread using the questionnaire in the sample group. In general, questionnaires are meant to gather broad quantitative data. They may be directly controlled, circulated through electronic means, or provided to the participants. generally speaking, questionnaires are less costly and less time-consuming (Sekaran & Bougie, 2016).

Population and Sampling

Project managers at Jordan's first-class construction organizations are included in the study. This research only assessed the first-class firms because these organizations incorporate project management in their

projects. The project managers of these entities are better qualified to give valuable input to the project team and to communicate their expertise in depth, thereby positively impacting the accuracy of the data that are gathered.

The sample size of more than 30 samples and less than 500 samples is sufficient for most studies (Roscoe, 1975). According to Jordanian Construction Contractors Association (2020), there are about 311 projects related to first class construction companies that were completed or in progress during 2020. Since each project will have a project manager, a total of 220 surveys have been distributed based on this. Only 165 questionnaires were returned from the distributed questionnaires. According to above, the sample size of 165 is appropriate for statistical analysis procedure.

Measures and Instrumentation

The questionnaire utilized primarily closed questions, which allow participants to choose standardized answers from, such as questions of a multiple-choice test. Since the closed-ended questions offer fewer differences in the answer than open-ended questions, participants feel easier and quicker to finish, and it is more effective to perform coding of answers for study. All objects are close-ended questions. In this sample, nevertheless, the responses to these topics ranged from "1" (totally disagree) to "5" (totally agree) using a five point Likert scale, see Table 1.

The measurement items used in this research have been developed and evaluated from related literature. To assess RM in the construction industry background, the analysis adjusted the seven-item scale from Lepmet's (2007). To quantify KM, the study also adopted eleven items from Jiao et al. (2019) and Chen and Mohamed (2010). Fernando et al. (2018) also developed afive-item scale to calculate PMP. Ultimately, seven PS scales adapted by Fernando et al. (2018) and Nguyen and Watanabe (2017) have also been used by the researchers. Table 1 presents a list of items per construct.

Table (1) The items used for measurements of the constructs

Code	Item	References
Risk Management (RM)		
RM1	Risk management scope was established	Lepmets (2007)
RM2	Risks were identified	
RM3	The risks were analyzed	
RM4	The risk treatment actions were defined and performed	
RM5	The risks were monitored	
RM6	Corrective action was taken, when needed	
RM7	Overall, the project's risks were well managed	
Knowledge Management (KM)		
KM1	Project members shared the minutes of meetings or discussion records in an effective way.	Jiao et al. (2019) and Chen and Mohamed (2010)
KM2	Project members always provided technical documents, including manuals, books, training materials to each other.	
KM3	Project members shared project plans and the project status in an effective way.	
KM4	Project members tried to share expertise from education or training in an effective way.	
KM5	The often project team provides professional technical support for other projects within the project	
KM6	The project team can freely access the information and knowledge provided by other projects.	
KM7	The company use database and other technologies to preserve knowledge and experience of projects.	
KM8	Project members can easily access the database for knowledge help.	
KM9	Project members Used accumulated knowledge to solve new problems.	
KM10	Project members Used shared knowledge to improve efficiency.	
KM11	Project members Applied knowledge learned from mistakes.	
Project Management performance (PMP)		
PMP1	Our project teams are able to work together to achieve the project objective successfully.	Fernando et al. (2018)
PMP2	We have competent project team members.	
PMP3	Our project strategy has given more effort to managing the progress of a project	
PMP4	We use project management life cycle to guide us in monitoring the progress of a project	
PMP5	We always ensure that a project progresses in line with our key project performance	
Project Success (PS)		
PS1	Our project was completed on time.	Fernando et al. (2018) and Nguyen and Watanabe (2017)
PS2	Our project was completed within budget	
PS3	Our project was meet scope as specified	
PS4	Our project was meet quality as specified	
PS5	Our project was meet the expectations	
PS6	Safety and environmental conditions of project were satisfied.	
PS7	Overall, the project was a success	

Data Collection

According to the Jordanian Construction Contractors Association (2020), there are about 311 projects related to first class construction companies that were completed or in progress during 2020. Since each project will have a project manager, a total of 220 surveys have been distributed based on this. Only 165 questionnaires were returned from the distributed questionnaires.

Results

We utilized AMOS version 20 to implement Structural Equation Modelling technique (SEM). The study examined hypothesized direct effects and mediations between these constructs. Also, perform a confirmatory factor analysis (CFA) on the construct variables which have a quantity of five. Table 2 illustrates the convergent validity results to show to what extent multiple attempts lead to notice the agreement when evaluating the same notion (Hair et al., 2010).

Table 2. Internal Reliability and Convergent Validity

Construct	*Item Number (30)*	*Final Factor Loading*	*Average Variance Extracted (AVE)*	*Composite Reliability (CR)*	*Internal Reliability Cronbach Alpha*
Risk Management (RM)	7	0.728 - 0.803	0.570	0.902	0.902
Knowledge Management (KM)	11	0.686 - 0.891	0.655	0.950	0.948
Project Management performance (PMP)	5	0.801-0.810	0.651	0.903	0.903
Project Success (PS)	7	0.748 - 0.857	0.692	0.940	0.939

Table (2) represents the result of Cronbach alpha and convergent validity for the second iterative CFA model with 29 remaining items. The number of deleted items (1 deleted item) was relatively low compared to the total items in the constructs (30 items). As shown in Table 2, the remaining indicators have high factor loadings ranging from 0.686 to 0.891, indicating that the meaning of the factors has been preserved by these indicators.

Table (2) also shows that the AVE, which reflects the overall amount of variance in the indicators accounted for by the latent construct, ranged from 0.570 to 0.692. All these values were above the cut-off 0.5, as suggested by Nunnally and Bernstein (1994). The Composite Reliability (CR) value, which depicts the degree to which the construct indicators indicate the latent construct, ranged from 0.902 to 0.950. All these values exceeded the recommended value of 0.6, as recommended by Bagozzi and Yi (1988).

Table (3) Descriptive Statistics and Discriminant Validity

Constructs	Mean	Standard Deviation	RM	KM	PMP	PS
Risk Management (RM)	3.140	0.727	**0.755**			
Knowledge Management (KM)	3.164	0.830	0.457	**0.809**		
Project Management performance (PMP)	3.463	0.860	0.599	0.586	**0.807**	
Project Success (PS)	3.560	0.979	0.675	0.617	0.773	**0.832**

Note: Diagonals represent the square root of the average variance extracted while the other entries represent the correlations.

Table (3) represents the discriminant validity of the measurement model. The inter-correlations between the four constructs ranged from 0.457 to 0.773, which were below the threshold 0.85 as recommended by Kline (2005). Upon examining goodness to fit of data, convergent validity and discriminant validity of the measurement model, it can be concluded that the modified measurement scale that assesses the constructs and their relative items was reliable and valid.

The mean was applied as a measure of central tendency, which indicated that the mean values of all constructs were above their midpoint level (3), as indicated in Table 3. The phenomenon indicated that the consensus respondents' perception toward these constructs were above the average. The highest rating mean belonged to PS with the mean value of 3.560. The lowest rating mean belonged to RM with the mean value of 3.140. Furthermore, among the studied variables, the individual value of PS deviated the most from its mean (SD = 0.979). This standard deviation suggested reasonably high variability in respondents' perception toward PS. In other words, the survey participants were most varying in this variable from each other. At the other side, the lowest deviation from mean belonged to RM, with the standard deviation of 0.727.

Table (4) Results of Direct Impact Hypotheses Assessment

Path	Unstandardized Estimate	S.E.	Standardised Estimate Beta	c.r	P-value	Hypo.	Result
RM → PS	0.368	0.093	0.298***	3.95	0.000	H1	Supported
KM → PS	0.194	0.066	0.202**	2.965	0.003	H2	Supported
RM → PMP	0.507	0.102	0.419***	4.947	0.000	H3	Supported
KM → PMP	0.372	0.075	0.395***	4.961	0.000	H4	Supported
PMP → PS	0.487	0.091	0.477***	5.373	0.000	H5	Supported

*p< 0.05, **p< 0.01, ***p< 0.001

As shown in Table 4, all paths from RM and KM, on PMP and PS, as well as the path from PMP on PS were statistically significant as their p-values were all below the standard significance level of 0.05. Thus, the hypotheses H1, H2, H3, H4 and H5 were supported.

Table (5) Results of Examining Mediation Effects of Project Management Performance (PMP).

DV = PS, M = PMP	Independent Variables (IVs)	
	RM	KM
Total Effect of IV on DV without M	0.497**(sig:0.001)	0.390**(sig:0.001)
Direct Effect of IV on DV with M	0.298**(sig:0.001)	0.202**(sig:0.001)
Indirect Effect of IV on DV through M	0.200**(sig:0.005)	0.188**(sig:0.005)
Effect of IV on M	0.419** (sig:0.009)	0.395**(sig:0.011)
Effect of M on DV	0.477** (sig:0.001)	0.477** (sig:0.001)
Mediation Path	RM→PMP→PS	KM→PMP→PS
Mediation Effect	Yes	Yes
Degree of Mediation	Partial	Partial
Hypothesis Result	H6 Supported	H7 Supported

As shown in Table (5), PMP mediates the effects of RM and KM on PS. Accordingly, hypotheses H6 and H7 were supported.

The results showed that there was a significant relationship between RM and PS in the absence of PMP, with the standardized total effect of 0.497 and the P-value of 0.001. Consequently, the total effect of RM as IV on PS, as DV without the inclusion of PMP, and as M was statistically

significant at 0.01 level. This relation was still significant even after including PMP into the model, with the standardized direct effect of 0.298 and the P-value of 0.001. Hence, the direct effect of RM as IV on PS, as DV with the inclusion of PMP, and as M was statistically significant at 0.01 level. As depicted in Table 6, the effects of RM as IV on PMP and as M was statistically significant at 0.01 level, with the standardized effects of 0.419.

On the other side, the effect of PMP as a mediator on PS and as DV was statistically significant at 0.01 level with the standardized effects of 0. 477. These results indicated that PMP mediates the relationship between RM and PS. The degree of mediation was partial since the direct effect was found statistically significant. The phenomenon supported the hypothesis H6.

Further, the result revealed that RM had a significant indirect positive effect on PS through PMP with the standardized indirect effect of 0.200, p-value = 0.001. The result showed that there was a significant relationship between KM and PS in the absence of PMP, with the standardized total effect of 0.390 and the P-value of 0.001. Thus, the total effect of KM as IV on PS, as DV without the inclusion of PMP, and as M was statistically significant at 0.01 level. This relationship was still significant even after including PMP into the model, with the standardized direct effect of 0.202 and the P-value of 0.001. Therefore, the direct effect of KM as IV on PS, as DV with the inclusion of PMP, and as M was statistically significant at 0.01 level. The effects of KM as IV on PMP and as M were statistically significant at 0.05 level, with the standardized effects of 0.395.

On the other side, the effects of PMP as M on PS and as DV was statistically significant at 0.01 level with the standardized effects of 0.477. These results indicated that PMP mediates the relationship between KM and PS. The degree of mediation was partial since the direct effect was found statistically significant. The phenomenon supported the hypothesis H7. Further, the result revealed that KM had a significant indirect positive effect on PS through PMP with the standardized indirect effect of 0.188, p-value = 0.001.

Fig. 2 represents the model of findings and the results of examining research hypotheses.

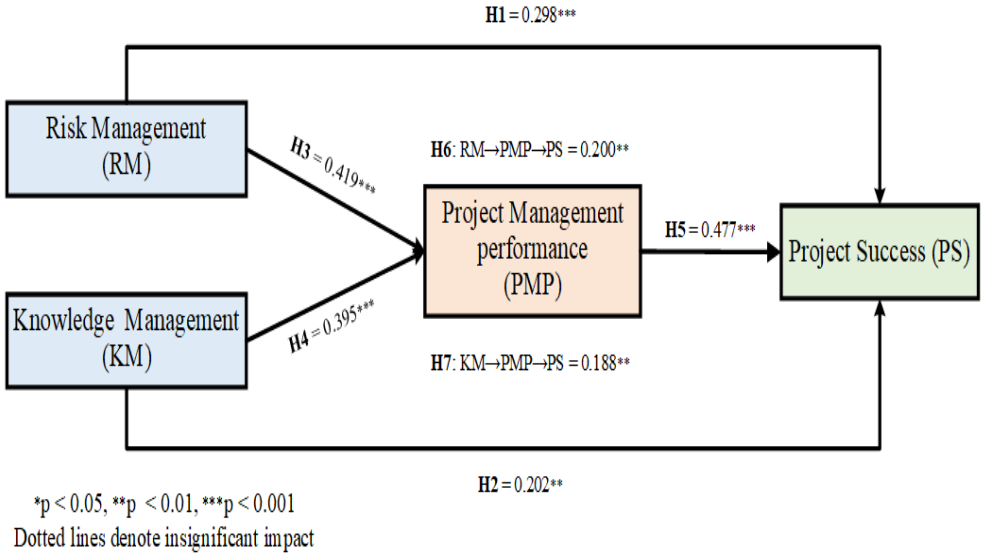

Figure (2) Model of Findings

Conclusion

The results indicated that RM has significant positive effects on PS. It is noteworthy that this is consistent with Naeem et al. (2018), who stated that the success of the project is greatly connected with project planning, RM, and organizational culture. Therefore, the researcher agrees with the result under consideration since RM assists construction companies in identifying, evaluating, and mitigating potential risks, which positively return on PS and enhance company performance.

In addition, the results showed that KM has significant positive effects on PS. This result is compatible with Latif et al. (2020), who stated that the knowledge management frameworks had a substantial effect on project performance. The findings show that the project-based organizations which use the knowledge management framework will increase the chances of a successful project considerably. Based on these grounds, the researcher agrees with such a result since knowledge management helps to enhance collaboration between teams; to exchange common practice materials, lessons learnt, techniques in project management and machine architecture,

explanations in evaluation packages and the reasons for policy choices; and to have more knowledgeable information in projects which positively reflected on project success.

The results indicated that RM has significant positive effects on PMP, which is compatible with Alkhlaifat et al. (2019), who showed that this is a significant phase in preventing performance failure, as the impacts of risk factors in project performance varies depending on the severity of risk management and the abilities of risk managers, but does not vary from the sophistication of the project. Accordingly, the researcher agrees with this result since RM has advantageous impact on enhancing project management performance.

The results also showed that KM has significant positive effects on PMP. This finding is consistent with Lierni and Ribière (2008) who stated the project managers consider the utilization of KM activities has a beneficial impact on enhancing project management. Based on such a ground , the researcher agrees with the result since knowledge management knowledge is an important resource, and the effectiveness of knowledge management is one of the main success factors of an organization, which positively reflected on project management performance.

Moreover, PMP was found to have significant positive effect on PS. This result is supported by Badewi (2016), who claimed that the performance of project management is intended to boost the quality of project management such that the chances of successful completion are improved. In light of this fact, the researcher agrees with such a result since the project management performance increases the probability of using high quality project practices efficiently through which it positively reflected on project success.

According to the results of mediation analysis, it was found that PMP partially mediates the effects of RM on PS. This finding is compatible with Fernando et al. (2018), who referred to the RM's beneficial connection with the performance of project management. The project leader's capacity to handle risk not only increases the success of a project as expected but will also guarantee that a project with other effected people is structured to minimize additional risks and to include the use of unsafe raw resources and unrequired additional costs. Hence, the researcher agrees with such a result since there is a link between RM and the ability of project managers to handle these risks which increase his management capability and positively reflected on project success.

Finally, from the results of mediation analysis, it was found that PMP partially mediates the effects of KM on PS. This finding is consistent with Levin (2010), who stated that each corporation needs to use project management to provide its goods and services to its clients and consumers with the best performance and advantages. If knowledge management is efficient, the business will turn the company into excellence. Accordingly, the researcher agrees with such a finding since there the knowledge management will enhance the project management and provide the technical skills and trouble solving expertise which are required for carrying out construction activities and positively reflect on project success.

Limitations

This analysis offers empirical proof of the effect of RM, KM, PMP and PS on the Jordanian construction projects. Even so, in the analysis advanced in this study, there are some limitations as follows:

The first drawback of this study applies to the utilization of a particular market. Although the current study examines the connection between the RM, KM, PMP and PS of construction projects, it does not apply to other fields, such as manufacturing projects or IT projects. As a consequence, there is a reduced capacity to extrapolate the recorded findings to other sectors.

The second limitation of this analysis has to do with the use of a single country. The use of specimens from a single country (Jordan) can yield results that are unique to the community and problematic to interpret across other environments. Subsequently, more studies are required to validate the study model in different regions in generalizing the results of this study.

The third drawback of this thesis has to do with the sample population. In this analysis the researcher asked only Jordanian project managers to define the connection between RM, KM, PMP and PS from the perspective of the contractor. It is also likely that the evaluations of other project managers from consultancy and planning firms would be much more reliable relative to the evaluations of project managers from construction firms.

The fourth restriction of this analysis is linked to the type of organization. The researchers interviewed only first-class companies to analyze the connection between RM, KM, PMP and PS in this report. Consequently, evaluations from other classes, such as the second class, may deliver more knowledge and may help to recognize the shortcomings of

these groups. The information collected will also not be used by firms of other classes.

Recommendations and Further Research

To address the shortcomings of this thesis stated above, further studies should be undertaken:

First, in order to validate and investigate the model built for this analysis, it would be of considerable importance to include other Middle Eastern countries for some further testings. This will prove useful in providing proof of the effectiveness of the conceptual framework through numerous Middle Eastern construction organizations. As the model's reliability may differ from one sociocultural context to the next, it will require experimentation. In order to gather information and a clear overall image on this subject in different countries, more observational studies requiring the gathering of data on different countries, especially Arab countries, are therefore suggested.

Second, this study concentrates only on construction companies. Therefore, a more detailed examination may include other categories of firms, such as consultancy and design companies, as well as provide evaluation from a deferent perspective.

Third, this report focused only on 1st class construction firms in Jordan. A prospective analysis could also broaden the focus of the study to include the groups of other classes of construction firms in Jordan in order to achieve a broader inference of the analysis.

Fourth, the study data are to be gathered at the same point of time. Therefore, the information collected on the study variables could vary over time. It also proposed that longitudinal studies should be undertaken at different points in time to analyze RM, KM, PMP and PS in the Jordanian construction sector. These longitudinal studies will provide a clearer picture of the Jordanian construction industry's development over the past few decades and will recognize how the extent of latent construct varies over time.

Fifth, using the questionnaire survey, this thesis applied the quantitative analysis method to solve the previous research questions raised and to validate the proposed research hypotheses. As a consequence, future studies can also use a qualitative analysis methodology to investigate these domains, especially case studies, in order to have a closer insight at how the research factors come into contact within the construction sector.

Sixth, considering the standardized questions, the essence of an online survey is limited and may lead to prejudice. This survey was based on earlier studies and is subject to the memory of the researcher, in which the information given on the basis of the participant may be selective and arbitrary. It is proposed that by asking open-ended questions, future studies could enable even for more rationality. Greater attendance could decrease the risk of biasness within the information collected.

In the seventh position, further studies should also be carried out to extend the research concept by taking into consideration other relevant aspects that could affect the PS. In prior research, for instance, and as mentioned in the literature review, indicators such as project duration, project management certification, and organizational culture have been suggested as independent variables to be critical characteristics that affect PS. Future studies should also incorporate more factors in the conceptual framework in efforts to realize a detailed understanding of how these parameters have a synergistic effect on PS and on origination efficiency.

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