The Impact of Manager’s Hard Skills and Risk Management on Construction Project Performance

By Nasir Al Asaadi

Abstract- Today, construction professionals understand the complexity and everchanging nature of the construction works which continues to raise enormous challenges for managers. While risk management has been one of the major concerns of executives and professionals involved with projects today, especially after several financial crisis that shook the world in the current era. Moreover, the failure of project managers to control risks will cause a dramatic failure of many construction projects in meeting deadlines, cost and quality and project targets, where the defects of all these factors are weakening construction project performance at the end. The aim of this study is to examine the effect of project management hard skills on project performance as well as investigating the mediation role of project risk management on the association between project management hard skills and project performance. The survey has been conducted in construction projects in Oman. The methodology used in this study is a quantitative approach based on causal and correlation research strategy. The empirical results of this study showed that project management hard skills are correlated with project risk management and construction project performance.

Keywords: project risk management, project management hard skills, construction project performance.

GJMBR-A Classification: JEL Code: M00

Strictly as per the compliance and regulations of:
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Abstract- Today, construction professionals understand the complexity and everchanging nature of the construction works which continues to raise enormous challenges for managers. While risk management has been one of the major concerns of executives and professionals involved with projects today, especially after several financial crisis that shook the world in the current era. Moreover, the failure of project managers to control risks will cause a dramatic failure of many construction projects in meeting deadlines, cost and quality and project targets, where the defects of all these factors are weakening construction project performance at the end. The aim of this study is to examine the effect of project management hard skills on project performance as well as investigating the mediation role of project risk management on the association between project management hard skills and project performance. The survey has been conducted in construction projects in Oman. The methodology used in this study is a quantitative approach based on causal and correlation research strategy. The empirical results of this study showed that project management hard skills are correlated with project risk management and construction project performance. The main significance of this study is filling the gap in literature with regard to the role of risk management in construction projects in Oman as well as understanding the direct and indirect effect of hard skills of project managers in construction industry.

Keywords: project risk management, project management hard skills, construction project performance.

1. Introduction

The construction industry is vital since rapid economic development has increased the demand for construction of infrastructure and facilities around the globe. The construction industry also provides the basic living conditions for the sustainability and development of human life on the earth. To cope with an ever-increasing population, pressure on land, and growing economic activity, construction projects are in increasing demand and activities are booming in many countries (Zhang et al., 2017). Construction professionals understand the complexity and everchanging nature of the built environment which continues to raise enormous challenges for managers. The industry has embraced managing people as an effective strategy in managing successful projects (Uzor, 2019).

Project Management is the planning, organizing, monitoring, and controlling of all aspects of a project and the management and leadership of all involved to achieve the project objectives safely and within agreed criteria of time, cost, scope, and performance/quality. It is the totality of coordination and leadership tasks, organisation, techniques, and measures for a project. It is crucial to optimize the parameters of time, cost and risk with other requirements and to organize the project accordingly (IPMA, 2006). Project Management is an innovative management practice that tends to achieve stated or specified objectives within specific time and budget limits through optimum use of resources. Achieving success in construction project implementation process is the major function of project management (Kehinde et al., 2017).

The critical key for ensuring the success of complex projects is having a skilled project manager (Shane et al., 2014). Some construction projects are technically complex such as when using a new technology that are not understandable by the project members. In addition, this type could be specified when there is no qualified manager that could manage the new technology involvement although it is recognized to the organization (Faisal et al., 2020). A project manager is a key person who’s responsible for the construction project success. It is important that construction project manager must have knowledge and skills in term of management and technical skill. Therefore, project manager should improve their personal knowledge management skills in order to help them develop and implement project management knowledge and skills for their construction project (Khamaksorn, 2018).

Today, construction professionals understand the complexity and everchanging nature of the construction works which continues to raise enormous challenges for managers. While risk management has been one of the major concerns of executives and professionals involved with projects today, especially after several financial crisis that shook the world in the current era. Therefore, this study is an attempt to examine the link between project management and performance in construction industry. The results of this study is expected to support the economy of Oman by developing the performance of construction projects.
and reduce the level of potential risk by assigning qualified managers who can control the risk associated with these projects depending on hard skills.

II. The aim of Study

The aim of this study is to examine the effect of project management hard skills on project performance as well as investigating the direct role of project risk management on project performance. The survey has been conducted in construction companies in Oman.

III. Methodology

This study utilized quantitative methods to examine the relationship between the variables of this study. Quantitative research is subjective by observation and empirical data, which means that quantitative approach, is mainly concerned with evaluating the cause and effect of specific phenomena and then uses the collected data by empirical observation methods. The respondents are project managers in local construction companies in Oman. Thus the total number of population of this study = 1187 project managers. As the researcher will not be able to test all population because it is too expensive and time-consuming. The researcher has distributed 400 questionnaires to the project managers in local construction companies. Out of the 400 questionnaires distributed to the study sample, 376 valid questionnaires have been considered for the analysis.

IV. Problem Statement

This study assumes that most projects in Oman are lacking assessment to hard skill of project manager who should be responsible to control budget, deadlines of deliveries, and quality of materials and design before assigning the jobs to the workers and line managers. These are the major issues facing projects in Oman, while the weak familiarity with formal risk management concepts and methods is another problem need to be solved. Therefore, these issues are continuously on the rise and there are signs of accentuating year after year suffering significant financial losses. Based on these arguments, the problem statement of this study lies in understanding how risk management plays a mediator role with hard management skills towards project performance in construction industry.

V. Hard Skills of Project Manager

The role of project manager is one of the crucial factors in achieving project success. Project managers handling large and complex construction projects have to deal with several factors to ensure coordination in achieving project delivery based on time, cost, and quality (Faisal et al., 2020). As construction projects change over time, there is need for managers and supervisors to continuously develop and improve their managerial skills and competences to enable them deliver the mandates of their projects successfully (Uzor, 2019). With companies and organizations becoming more project oriented, there has been ongoing discussions in the project management community to determine key elements that contribute to project success. Inevitably, the knowledge, skills and abilities of a project manager become an important component which contributes to a project’s success (Gulati et al., 2020). Project Management Institute (PMI) studies applied the Project Manager Competency Development Framework (PMCD) to the skills required by a project manager through use of the PMI Talent Triangle. This talent triangle focuses on three key skills sets namely, technical project management (hard skill).

Since hard skills are those in which companies are trained to address the technical requirements of a task or project, therefore managers in most construction projects are being select primarily based on their stated or demonstrated technical abilities (Lewis, 2012). The hard skills of project managers play its role in the success of a project since these skills enable project managers to better plan, execute, and evaluate project progress. Unlike soft skills, hard skills or technical skills are the technical aspects of the project manager’s role and include development of tangible deliverables such as project schedules, budgets and work breakdown structures. Hard skills often involve the use of templates and tools such as scheduling software, spreadsheets and modeling tools (Kutsch & Hall, 2010). Generally, the hard skills related to the project management include planning, evaluation, monitoring, scheduling, and risk management (Muhammad, 2019).

Banihashemi et al. (2017) affirmed that managers and supervisors must learn other skills apart from the traditional technical skills relevant to their jobs. The study further emphasized the need for managers and supervisors to also develop skills that are more conceptual and interactive in nature (Uzor, 2019). Such skills are likely to lead to a more collaborative management philosophy. These skills are likely hard to develop as Carvalho and Rabechni (2015) warned, since they are behaviourally non-specific and are not readily learned through repetition.

While the skills can be defined as the capacity to accomplish a task to a certain specifically defined standard, in direct comparison, the more holistic term competency means the fundamental attributes of a person, such as abilities, knowledge and attitudes needed to fulfill competent standards (Hunnius & Schuppen, 2013). This is illustrated by Cartwright and Yinger (2007) in Figure 1 as three dimensions of competence, which are Knowledge, Performance (abilities) and Personal (attitude) and are demonstrated in different ways outlined below. Knowledge competence is demonstrated by passing an appropriately credential examination. Personal
competence can be demonstrated by the manager's behaviour, which contributes to the delivery of successful projects. Performance competence can be demonstrated by the successful delivery of projects (Cartwright and Yinger, 2007).

Figure 1: Three Dimension of Competences (Cartwright and Yinger, 2007).

According to Piante (2010) project managers must possess two different kinds of hard skills. Firstly, they need to have technical skills within the domain of the project they are managing. Additionally, they must possess project management specific technical skills such as creating Gantt charts, conducting status meetings, calculating earned value and other skills necessary for conceiving ideas, solving problems and overall manage projects. This position is supported by the research of Lewis and Boucher (2012) which states that "one cannot ignore or devalue the importance of the hard skills" (Lewis & Boucher, 2012, p. 2), partly as it is the hard skills that allow us to become known for certain technical competences in our chosen profession. They argue that these competences are a key ingredient in every project life as they address the technical requirements of project endeavor.

One of the recurring themes in the literature on skills development is skill reduction and lack of skills. Skills Knowledge is an industry in which the literature on design skills emphasizes the need for "project management skills" and "communication skills" for the construction sector. Table 1 presents a summary of all the complex skills acquired by various literary authors

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<tbody>
<tr>
<td>Time management</td>
<td>X</td>
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<td>HR management</td>
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<td>Communication management</td>
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<td>Integration management</td>
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<tr>
<td>Cost management</td>
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<td>Quality management</td>
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<td>Risk Management</td>
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<td>Procurement</td>
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<td>Stakeholder management</td>
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<td>Contract management</td>
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<td>Safety and Health</td>
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<tr>
<td>Supply chain management</td>
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VI. Project Performance

The project comes with several criteria. Something acceptable in case of one project with the best impact is failure in matters of the other project. People have got to say various things regarding the judgment and the success of the project based on the personal objectives. Two managers can want to make of the project for the reason of increasing the power base based on the cost of the other, only one of them will become successful (Muller and Turner, 2007). The success of the golden triangle of the project will involve the quality, cost and time and it is the
conventional criterion of the success of the project (Bakhsheshi and Nejad, 2011).

The performance of each construction project depends on the success factors. The success factors of a project are elements of the project likely to be affected by an increased likelihood of success; These are independent variables that make success more likely. Project success criteria are measures that measure a positive outcome of the project; they are a dependent variable that measures the success of a project. Success factors are the contribution to a management system that leads directly or indirectly to the success of a project or a business.

Based on the two arguments above, to understand the importance of project success, success is not necessary because it is a combination of subjective and objective perception. In addition, project errors show an interest in research.

The success of the project depends on factors such as planning, monitoring and management, team selection, technical specifications, communication, leadership, strategic direction, team development, risk management (monitoring and control), organizational support, stakeholder management, organizational structure and project definition (Crawford, 2000). Table 1 provides details on the dimension to project success through factors that could contribute to project successes descriptively (Hartman and Ashrafi, 2002).

<table>
<thead>
<tr>
<th>Success Factors</th>
<th>Description</th>
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<tbody>
<tr>
<td>Project Mission</td>
<td>Clearly defined goals and direction</td>
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<tr>
<td>Top Management Support</td>
<td>Resource, authority and power for implementation</td>
</tr>
<tr>
<td>Schedule and Plans</td>
<td>Detailed specification of implementation</td>
</tr>
<tr>
<td>Client Consultation</td>
<td>Communication with and consultation of all stakeholders</td>
</tr>
<tr>
<td>Personnel</td>
<td>Recruitment, selection and training of competent personnel</td>
</tr>
<tr>
<td>Technical Tasks</td>
<td>Ability of the required technology and expertise</td>
</tr>
<tr>
<td>Client Acceptance</td>
<td>Selling of the final product to the end users</td>
</tr>
<tr>
<td>Monitoring and Feedback</td>
<td>Timely and comprehensive control</td>
</tr>
<tr>
<td>Communication</td>
<td>Provision of timely data to key players</td>
</tr>
<tr>
<td>Troubleshooting</td>
<td>Ability to handle unexpected problems</td>
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</table>

The table contains a description of ten factors that can contribute to the success of each project. These ten factors show a balance between functional tasks and people management, both within the organization and beyond. The following are two components that was used in this study to measure project performance.

**VII. Technical Tasks**

The success parameters for each project have a temporary budget and the required performance in terms of technical requirements (Olajid et al., 2016). Very few projects represent the unique nature of construction projects. The product of construction processes is rarely the same, each with a unique set of features and functions that sets them apart from other projects. This study concluded that the performance of any construction project is determined by the required technology and technical expertise available in the project. For this hypothesis, the influence of this factor on project performance will be measured in the empirical part of this study.

**VIII. Client Acceptance**

The client acceptance is an important factor that decide the performance of project. The client decides when the project is done. The responsibility of project manager to demonstrate that the deliverables (whether products or services) meet client specifications. For small projects, this acceptance can be very informal and ceremonial, or it can be very formal, involving extensive acceptance testing against the client's performance specifications. Horace (2012) defined client acceptance as "Potential clients have been contacted about the usefulness of the project. Adequate advanced preparation has been done to best determine how to sell the project to the client". He also argues that the closing process is complete when there is a formal
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acceptance of the project deliverable and all administrative activities of archiving of files and documenting lessons learned are completed. While Kuen and Fernando (2009) stated that client acceptance is one of the success factors affecting the success of project and without getting client acceptance the project is not performing well. Another study by Marthinus (2018) also found that client acceptance is an important factor which must be handled in a similar way to any other factors affecting the performance of the project. To ensure end product acceptance by the client, it must be considered during the project life cycle. He suggested that project manager involves obtaining formal acceptance of the product or service from clients. An official sign-off is required as an acknowledgement by the customer and is filed as part of the project documentation. His study showed that the respondents are equally in agreement on testing and acceptance parameters are usually known in advance.

IX. ELABORATING RESEARCH HYPOTHESES

In this section, the author demonstrates the relationships between project risk management, project management hard skills, and construction project performance. The discussion in this section implies the empirical evidence found from the results of previous studies covering the topic of this study. From these evidences, this study develops the statements of hypotheses in order examine them in the empirical part of this research.

a) The relationship between project manager hard skills and project performance

The relationship between project manager skills and project success is important, considering the contingent effect of project complexity. This relationship is also combines aspects of soft and hard skills of project manager. The researchers’ work shows the relationship that may exist between project manager skills and project success. It is well understood that technical skills have a significant effect on project success (Habiba, 2019).

Riza (2015) has identified hard skill components that influence the performance of construction projects. These components are time, cost, and quality performance in construction projects. Data were collected from 107 project managers using a questionnaire survey method. The analysis results show that interpersonal influence has positive relationship with project time performance. Project cost performance is influenced by four skill components, namely, emotional intelligence, interpersonal skill, apparent sincerity, and budgeting. Lastly, project quality performance is affected by eight skill components, which include visioning, emotional intelligence, interpersonal skill, transformational leadership, interpersonal influence, apparent sincerity, quality management, and document and contract administration. While Marly (2014) aimed to elucidate the relationship between project management skills and project performance, considering the contingent effect of project complexity. The approach adopted by the researcher combines aspects of soft and hard skills of project manager.

Project managers involved in complex projects need to have strong skills to handle their team and every project participant. Project manager has the highest importance and critical to the success of the project (Faisal, 2020). The literature review has indicated several skills that are important for project managers. The type of project determines the type and extent of skills that is required in successful project outcomes. Based on these findings, the following hypothesis has been examined in the empirical part of this study.

Hypothesis 1: Project management hard skills has a significant effect on construction project performance

b) Relationship between project risk management and project performance

Today, one of the main requirements of project manager is to have strong skills which entitle him/her to practice risk management. The review of previous studies revealed a strong association between project risk management and project performance. A statement that “a higher risk may lead to a higher gain” Opran (2012), and minimizing the risks in projects will improve the output of projects. Risks have a significant impact on a construction project’s performance in terms of cost, time and quality (Vláduț, 2013). As the size and complexity of the projects have increased, an ability to manage risks throughout the construction process has become a central element preventing unwanted consequences. Project risk management is recognized as an important exercise that creates value to a project and improves construction project performance. While the factors such as cost, time, and quality are essential measures of a project performance in construction industry, the success or failure in any construction project can be seen through effective risk management (Mohd et al., 2019). Thus, applying effective project risk management positively impacts construction project performance and leading to high degree of project success. It is found that the lack of adequate knowledge and poor project risk management in construction projects causing weak construction project performance (Mohd et al., 2019).

In the same context, Lawrence (2015) indicated a strong connection between risk management and project performance in construction industry. He found that risk management practices at planning stage had an effect on project performance. The research project indicated that most projects had some input from a qualified engineer and architect. However most respondents had not studied risk management.
the study indicated that risk management was widely practiced at 92%, the process was mainly in formal. The process of risk management was not adequate and no measures were put in place to mitigate the risks. Various project team members had different chances in managing the various risks with the client having the best chance of managing most risks at the planning stage by involving skilled professionals in decision making. While Alshibly (2013) investigated the impact of risk management on construction projects success. The results of Alshibly’s study indicate that there is an impact exists between both risk identification and risk assessment on project success, scheduled time, planned budget, and the ability to comply with technical specifications.

The purpose of a study conducted by Marlyn (2014) was to investigate the relationship between risk management and project success, taking into account the potential impact of project complexity. Another study by Lawrence (2015) showed a strong link between risk management and the performance of construction projects. He noted that risk management practices during the design phase influenced project performance. The research project showed that most projects had some input from a qualified engineer and architect. However, the defendant had not examined risk management. Although this study showed that 92% of risk management was widespread, the process was mainly informal.

While Roque and Marly (2013) have investigated the impact of risk management on project performance. The aim of this study is to measure the prevalence of risk management practices in Brazilian companies. The results show that the implementation of risk management practices has a significant positive impact on project performance. In addition, Risk management is directly related to the impact on performance and project success Haitham (2013) and the results show that between risk identification and risk assessment there is an impact on project success, planned budget, timing and adherence. Based on these findings, the following hypothesis has been examined in the empirical part of this study.

**Hypothesis 2**: Project risk management has a significant effect on construction project performance

c) **The relationship between project hard skills and project risk management**

The hard skills of Morreale (2008) notes that because so much money has been spent on ‘hard skills’ training, methods, tools, techniques, processes and procedures, surely there must have been a vast improvement in project success? According to Morreale (2008), current surveys of projects find that approximately 90% of projects fail when measured against the criteria of cost, schedule and expectations.

By adopting risk management, savings potentials can be realized in construction projects. For this reason, for project managers as well as real estate developers, a consideration of the risk management process is worthwhile. The risk management process comprises 6 process steps, which will be discussed in greater detail below. The integration of a risk management system in construction projects must be oriented to the progress of the project and permeate all areas, functions and processes of the project.

Projects within the construction sector is characterized as fragmented, temporary and complex which inherently brings upon risk exposure. Decision makers within the industry need reliant access to information and knowledge in order to manage risks in a sufficient and systematic way. Thus, the implementation of an effective risk management in relation to managing associated project risk knowledge may facilitate successful construction project endeavors (Dario, 2015).

The existence of individuals and of any activity is accompanied by inherent risks that take particular forms depending on the size, type and conduct. Effects of these risks are direct and powerful are reflected upon these activities (Paweł, 2017).

Although the risk is not perceived to be destructive the events classified as generally risk are adverse. They cannot be totally eliminated, but the establishment and enforcement of measures can reduce more within any organization and / or project it is natural to make substantial efforts to identify sources of risk and to establish procedures to allow keeping risks under control (Gallego, 2017). It is the prerogative of project risk management discipline that has developed rapidly in recent years, both at conceptual, theoretical and practical level. Failure to give due importance to the effects of risks could lead to material financial loss record and unfortunately human (Văduț, 2013). Based on the findings of previous studies, the following hypothesis statement will be examined in the empirical part of this research:

**Hypothesis 3**: Project management hard skills has a significant effect on project risk management

**X. Results and Analysis**

To justify the direct relationships between variables the Critical Ration (C.R) is applied to validate each hypothesis as well as significance level of regression coefficients. C.R is formed by dividing an estimate by its standard error. The following two criteria are used to validate the hypotheses of this study.

1. The C.R ≥ 1.96 or ≤ -1.96 for a regression weight. Then a hypothesis is true, otherwise the hypothesis should be rejected (Garson, 2005; Chen et al., 2010; Hair et al, 2010)

2. The estimate path coefficient for a relationship is significant at the 0.05 cut-off point (Sig. ≤ 0.05)
The justification of each hypothesis is indicated in Table 2 shows that all values of C.R ≥ 1.96 and ranging between lowest value C.R = 2.659 (Hypothesis 3) and highest value C.R = 3.985 (Hypothesis 4). Moreover, the level of significance ≤ 0.05 for all relationships indicates that all hypotheses are validated and accepted. From this result it is concluded that hard skills influence two variables at once namely: risk management and construction project performance in direct relationships. While hard skills affecting construction project performance directly and indirectly.

In summary, the SEM analysis shows that Hypothesis 1, Hypothesis 2, Hypothesis 3 are validated to be true and not rejected. In other words, there are significant and positive correlations (direct effects) between the three constructs of the conceptual framework.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Hypothesis Statement</th>
<th>C.R</th>
<th>Result</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothesis 1</td>
<td>Manager’s hard skills has a significant and positive relationship with construction project performance.</td>
<td>2.836</td>
<td>Validated</td>
<td>0.005</td>
</tr>
<tr>
<td>Hypothesis 2</td>
<td>Risk management has a significant and positive relationship with construction project performance.</td>
<td>2.659</td>
<td>Validated</td>
<td>0.008</td>
</tr>
<tr>
<td>Hypothesis 3</td>
<td>Manager’s hard skills has a significant and positive relationship with manager’s hard skills</td>
<td>3.725</td>
<td>Validated</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Table 2: Hypothesis Justification**

**XI. Conclusion**

Risk management has been one of the major concerns of executives and professionals involved with projects today, especially after several financial crisis that shook the world in the current era. Moreover, the failure of project managers to control risks will cause a dramatic failure of many construction projects in meeting deadlines, cost and quality and project targets, where the defects of all these factors are weakening construction project performance at the end. It is apparent that in order for the industry to sustain a positive performance and achieve a continuous improvement in future and in order to meet the requirements of overall economic development, the adoption of project management tools and techniques as well as risk management is required. For this, the construction industry is one of the most important keys to overall social development in the world and Oman in particular.

The empirical results of this study showed that project management hard skills are correlated with project risk management and construction project performance. Therefore, the outcome of this study support the economy of Oman by developing the performance of construction projects and reduce the level of potential risk by assigning qualified managers who can control the risk associated with these projects depending on hard skills.

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