Determining the Effect of Software Project Managers' Skills on Work Performance

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ABSTRACT

This study investigates the factors influencing project managers' work performance, including decision-making, analytical, technical, interpersonal, and communication skills, with emotional intelligence as a potential moderator. Conducted within the Pakistani software industry, a comprehensive field survey using a well-designed questionnaire ensured reliable and valid data collection. The statistical findings confirm the positive impact of all five skill sets on project managers' work performance. Notably, emotional intelligence moderates the effects significantly for communication, interpersonal, and analytical skills. This research provides valuable insights into the critical attributes shaping project managers' effectiveness, offering a unique perspective by considering emotional intelligence as a potential enhancer or inhibitor of these skills' impact on work performance.

KEYWORDS

Emotional Intelligence, Managerial Skill, Project Managers, Software Industry, Work Performance

INTRODUCTION

In recent years, project management has been identified as a practice of creating and increasing the competitive advantage of companies. Organizations have started depending on projects to stay ahead of the competition (Ju et al., 2020; Anantatmula, 2010), due to which the role of project managers has gained much attention. The project managers are constantly facing pressure to handle the challenges and several problems to meet the expectations of stakeholders. "By tradition, project management has concentrated on the management of projects on a single location either within one organization or between two or more organizations. At this moment, emerging trends are altering the way projects are structured and managed, creating new challenges in project management research and practice" (Mandson & Selnes, 2015). Our focus was captured by a recent report that delved into the essential skills and experience that will be required by Australia's prospective workforce in the forthcoming decades, as highlighted by the Committee for Economic Development of Australia (CEDA) in the year 2015 (CEDA, 2015).

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A project manager has a diverse set of responsibilities and duties like coordinating customers, conducting meetings, preparing budgets, etc. (Shastri et al., 2021; Howard, 1999). In the case of software projects, both developing and mature countries have a high proportion of project failures (Ebad, 2016). As the project's success has been considered as a result of project managers' efficiencies and competencies. "*It is not just the technical factors in a project that impacts project performance but there are some behavioral attributes that practitioners need to have in order to cope with project difficulties and then add to project outcomes*" (Zaman et al., 2019). Hence, several skills set, and leadership styles have been studied to identify the critical success factors for a project manager's performance. Along with several hard and soft skills, the emotional intelligence of project managers has also gained importance. Emotional Intelligence is defined as "…*the ability to monitor one's own and others' feelings and emotions, to differentiate among them and to use this information to guide one's thinking and actions* (Salovey & Mayer, 1990)".

Due to the critical nature of projects across each industry and several problems and responsibilities faced by project managers, the question arises that how to combat these problems and what skills are necessary for a project manager to equipped with to enhance their work performance? Researchers like Kerzner (2010), found that most of the project performance can be credited to the individual characteristics of the project manager e.g., behavioral features such as attitudes and interpersonal understanding and abilities (Lechler, 1998), are linked to project performance. Companies give the project managers complete obligations regarding guiding and conveying project results. Hence, the project manager's tasks are to assuming liability for planning and incorporating activities in different specialized and technical lines and communicating with stakeholders.

Project Managers' diverse skill set is essential for their work performance and ultimately project success. As, it has been observed in the previous research that the "project failure rates are high, and interestingly much of the project failure is not related to knowledge or know-how, but to project participants' lack of social intelligence, personal skills, poor leadership, inadequate communication and inability to solve conflicts" (Srica, 2009). This means that project performance is dependent upon human skills. Clarke (2010) identifies that the emotional intelligence of project managers helps them to enhance problem-solving skills of solving new challenges and problems. This trait may also help them to inspire and motivate their other team members.

There has been a plethora of research on identifying the skill set of a project manager for his successful project management. Still, there is more need to do empirical research. A set of characteristics has been outlined as desirable for an effective project manager, but a unanimous agreement on this list is lacking (Maqbool et al., 2017). This lack of consensus regarding the essential skillset for successful project management has prompted the initiation of this research, which seeks to explore the human dimension of project management. The study aims to delve into how specific managerial skills and emotional competencies impact the performance of individual project managers.

Even though it is realized that great administration abilities and project achievement are connected, usually overlooked or downsized in writing about project management. Writing on project management frequently manages specialized or technical components e.g., time administration, project structure, and so on. That could just be a direct result of the unobtrusiveness of the project managers. Ordinarily, project managers stress the significance of the group or team than the manager. Lipsanen (2017) expressed the view that though numerous writers "have an opinion that leadership style and competencies have a significant impact to the success of a project, it rarely shows in researches". Khan, Long, and Iqbal (2014) also found that previous studies have largely focused on project success, however, competencies and leadership skills of managers are still lagging in studies. Companies face the need to develop and strengthen competencies (more in particular, hard, and soft skills) for their projects to improve cost, time, and quality. Rarely have studies or empirical tests of the application of people skills in software projects been conducted (Elizalde & Bayona, 2018; Hilary, 2018;). Lack of empirical data makes it difficult to determine how soft skills interact to affect project complexity

(Zaman et al., 2019). Therefore, it is necessary to understand what skills and competencies of project managers can enhance project performance.

By keeping in mind, the importance of identification of project manager's skills, this study aims to investigate the project managers' attributes that affect their work performance. For this purpose, decision-making skills (Alvarenga et al., 2019), analytical skills (Hwang & Ng,2013) technical competence (Jena & Satpathy,2017), interpersonal skill (Denney et al., 2020), and communication skill (Coffelt, et al., 2019) have been taken as independent triplet variables and their effect on work performance were checked. Emotional intelligence has been taken as a moderating variable that can enhance or hinder the effect of skills on the work performance of project managers.

Literature Review

Management Skills

Managerial skills are an important reason for any organization and project success. Every efficiency and effectiveness depend on certain sets of managerial skills. In the case of project management, a competent project manager is vital to project success, and several studies have highlighted critical skills. Personal competencies have consistently demonstrated their reliability and predictability in identifying successful project managers (Ballesteros-Sánchez et al., 2019). There are many studies conducted on managerial skills and their resultant effect on performance e.g., Moradi et al., (2020) found several necessary skills of project managers for project success including core and soft skills. In a study by Qu et al., (2014) behavioral characteristics were studied on software project success.

Ballesteros and Chavarria (2016) in their study tried to provide an understanding of effective project managers' skills. In a mixed-method research study and by collecting primary data with the help of semi-structured interviews with different professors who teach project management subjects. Their findings suggest that there is a strong need to work on developing the human skills for project management and to define the exact or most of the skills set for successful project management.

Langer et al., (2008) in their study measured different types of project management skills and their effect on project performance. In the light of contingency theory, they conducted a field study at a major IT service provider in India. They examined both hard and soft skills and found that soft skills play more contribution to success. Hwang and Ng (2013) identified several challenges that were confronted by project managers who accomplish green construction projects. They also determined the critical knowledge and skills that are essential to answer such challenges. They conducted a literature review, surveys based on questionnaires, and interviews with project managers. Along with knowledge areas, they identified the most important skills that are required to mitigate the challenges that were analytical, decision-making, team working, delegation, and problem-solving skills.

Katz's in 1974 developed taxonomy of managerial skills that are assumed to be required by all managers. He wrote an article "Skills of an Effective Administrator" in 1974 in which he clearly expressed his concern about this set of skills that enhance managers' effectiveness. These essential skills required by managers are technical, human skills, and conceptual skills. According to Katz's theory, a prosperous manager has a triplet managerial skill set i.e., conceptual, human as well as technical. In case of deficiency of each skill brings loss of being the successful project manager and generally successful organization. These triplet managerial skills are essential to implement basic functions of management which are planning, organizing, leading, and controlling. In today's organizations, it is not possible to imagine a successful manager without having these basic skills (Ahmadi, 2011). The selection of a manager is made simple by a skills-based leadership theory by creating a list of each candidate's competencies in important areas (Yi & Zulaikha, 2022).

Communication Skills of Manager and Work Performance

Communication skill is defined as "the process of conveying any thought, idea, concept, feeling or opinion between two or more people" (Valencia, 2007). In the context of project management,

communication skills are used to convey information to other members of the project. It was found that deficiency of communication skills brings enhanced cost of projects and ultimately decreases effectiveness (Nor et al., 2011; Avença et al., 2023). Chen et al., (2019) and Lyu and Liu (2021) found that presence of good communication skills is highly desired for project managers.

Javadzadeh et al., (2016) stated that "effective communication is one of the key success elements of managers because information as an important data in the light of effective communication is entered into the organization and when it entered into the organization, again it needs an efficient communication system so that it can be processed and like blood, it flows in the organization". According to Mehran et al., (2012) an effective communication skill relies on verbal skill, listening skill and feedback skill. Lavoi (2007) in a descriptive study identified the most significant obligatory skills for managers. He predicted that "making relationships, having good communication skills and reaching the objectives, were respectively evaluated as the three most important skills for managers in 2020". Hence, a hypothesis is deduced:

H1: Effective communication skills have a significant positive effect on the work performance of project managers.

Decision-making Skills of Manager and Work Performance

Radecki and Jaccard (1996) defined decision making as "how individuals use and combine information about a set of alternatives to make a decision" (p. 76). Oh et al., (2019) argued that in a constantly evolving technological landscape, project managers are tasked with the responsibility of mitigating risks and making rapid decisions. The success of construction projects hinges on high-quality decision-making, which is fundamentally dependent on the quality of information available (Tan et al., 2021).

These skills have the potential to enhance teamwork by fostering trust in the team leader. According to Rue and Byars (2009), all managers at all levels irrespective of their places in the organization must make decisions in the recreation of organizational goals. In practice, decision-making is the prevailing element across all management functions, including planning, organizing, staffing, leading, and controlling. "An employee's ability to correctly analyze a situation, understand tradeoffs, offer good recommendations, and make the right choice is often rewarded with increased freedom to self-manage, and with the opportunity to engage in more interesting and challenging projects" (Evans, 2002, p. 33). Posner (1987), highlighted that project managers should understand the critical problems he or she faces because in projects managers frequently face problems like insufficient resources, deficient time, and vague goals, etc. Hence, managers must have problem-solving and decision-making skills. The project management works in a highly constrained situation, which requires effective decision-making skills among others. Arbabisarjou et al., (2016), in a study using the Delphi technique, found that nine competencies are required by managers which are Planning, leadership, decision making, teamwork, ICT, controlling, human resource management, organizing, and communication. Hence, a hypothesis can be formulated that:

H2: Effective decision-making skills have a significant positive effect on the work performance of the project manager.

Interpersonal Skills of Manager and Work Performance

Interpersonal skills consist of the "ability to motivate others, conflict management, effective communication, and team building" (Sunindijo & Zou, 2011). A manager's positive interpersonal qualities can enhance a working team's performance, ultimately contributing to the successful completion of a project (Ali et al., 2020). Interpersonal interaction's significance has gained increasing

prominence within the Washington Accord, recognized as a pivotal aspect of engineering projects (World Federation of Engineering Organizations, 2021).

Engineers as project managers require high levels of collaboration and refined interpersonal skills (Lynch et al., 2021). Lee et al. (1995) suggested that managers in the IT industry need to possess or acquire many skills such as multi facet or dimensional skills because they are not only expected to be proficient in technical skills but also in having inter personal and management skills. Interpersonal skills are considered the most important or relevant skills in comparison to technical skills in career development and getting to the top. Therefore, "project management should be able to build teamwork and cooperation by showing genuine intention to work cooperatively with others and use different approaches to get the best out of the team" (Cheng et al. 2005). Therefore, a hypothesis has been made that:

H3: Effective interpersonal skills have a significant positive effect on the work performance of the project manager.

Analytical Skills of Manager and Work Performance

Slipicevic and Masic (2012) defined analytical skill as "*the skills of knowledge/thinking that enable the use and assimilation of new information and use for planning purposes or for creating a system of planning*". Pang et al., (2018) ranked analytical abilities as one of the top five competencies at work. Analytical skills are nowadays essential for project managers in data analytics, as they enable them to collect, process, and interpret data from various sources and use it to make informed decisions, solve problems, and achieve project goals. Analytical skills include the ability to identify patterns, trends, correlations, and causal relationships in data, as well as to apply statistical methods, mathematical models, and visualization tools to analyze data. Analytical skills also involve the ability to communicate data insights effectively to stakeholders, team members, and clients using clear and concise language, charts, graphs, and reports (Dholakia, 2023).

Ahmed et al., (2013) in their study found that although, soft skills such as communication, analytical and interpersonal skills have been ignored in the context of the software industry, however, their importance and necessity to deal with clients cannot be overlooked. Hence, special attention and care are necessary to the acquisition of such skills. Brill et al., (2006), in a web-based Delphi study, found that a project manager must have "problem-solving expertise, leadership skills, context knowledge, and analytical, people, and communication expertise in addition to the more commonly emphasized project administration expertise". Many researchers (e.g., Aasheim et al., 2012; Christ et al., 2012; Seymour, 2013) have advocated that professionals essentially possess the analytical skills so that they can have the ability to analyze problems and issues across various stages of a project. Therefore, it can be hypothesized that:

H4: Effective analytical skills have a significant positive effect on the work performance of the project manager.

Technical Skills of Manager and Work Performance

Technical skill refers to knowledge of the application of techniques, tools, programming, and other necessary techniques in a technical field. Numerous contemporary projects entail intricate technical aspects and the management of sizable temporary teams, all within the constraints of limited resources, tight schedules, and unpredictable environmental conditions (Nicholas & Steyn, 2020). Technical proficiency can be assessed using three key metrics: 1) educational qualifications, 2) professional work experience, and 3) analytical aptitude (Nguyen et al., 2020). Abas-Mastura, et al., (2013) in their study found that employees' "skill acquisition and skill competence had a significant positive relationship to task performance. The acquisition and

competence on employability skills valued by employers require continuous enhancement to succeed in job performance". Sunindijo (2015) found that in the construction industry, project managers require many technical skills including scheduling, budgeting, quality management, document and contract administration, risk management, and procurement management. He found that in the context of technical skills, risk management is significantly greater than the other skill modules. Therefore, project managers should have sufficient knowledge of risk management due to the highly risky nature of the construction industry.

H5: Effective technical skills have a significant positive effect on the work performance of the project manager.

Emotional Intelligence

Among many definitions of emotional intelligence, one of the definitions is "the ability to carry out accurate reasoning about emotions and the ability to use emotions and emotional knowledge to enhance thought" (Mayer et al., 2008, p. 511). According to Fisher (2011, p.1001), project managers should work on making betterments in the area of people management because they need to adapt people's behaviors and skills. In a recent study, Liu and Liu (2023) studied the importance of leader emotional intelligence and teamwork outcome. This is also relevant to project managers, as he also leads teams and his emotional intelligence trait have potential to effect team members and project related positive outcomes. Maqbool et al., (2017) confirmed the role of emotional intelligence and project managers' competencies in determining the success of projects. According to them, project managers who possess a high emotional quotient, exhibit transformational leadership qualities, and are equipped with competencies such as effective communication etc. are anticipated to make a more substantial contribution to project success compared to their peers.

Obradovic, et al. (2013) in an empirical survey-based study tried to identify the correlation between project managers' emotional intelligence and professional success. They researched 75 project managers in ten Serbian Companies. In their study, a questionnaire was used, and the findings found a very high positive correlation between emotional intelligence and professional success. Xiong (2008) conducted a case study in a major international construction company. He tried to find the role of leadership as a key element in project management. Their results found that "leadership is one of the most important and essential factors in good project management. Leadership is more than simply managing people or projects: it is the art of affecting other team members' behavior to achieve the goals and accomplish the tasks successfully" (Xiong, 2008).

Vierimaa (2013) in made an effort to understand the perception of project managers towards an emotional aspect of leadership. They conducted semi-structured open-ended interviews with five project managers and compared their perceptions with previous theories or literature. The findings from this study confirmed that although emotional intelligence concepts are practically there in project management, however, still there is a need to provide more insights and shreds of evidence of the emotional intelligence concept. Nikbakhsh (2013) and Jorfi (2011) in their study found a strong relationship between emotional intelligence and communicative skills. In this study, emotional intelligence has been taken as a moderating variable which moderates the relationship between project managers' skills and their work performance. Hence, the following hypotheses have been formulated:

H1 (a): Emotional Intelligence positively moderates the effect of communication skills on the work performance of project managers.
H2 (a): Emotional Intelligence positively moderates the effect of decision-making skills on the work performance of project managers.

H3 (a): Emotional Intelligence positively moderates the effect of interpersonal skills on the work performance of project managers.

H4 (a): Emotional Intelligence positively moderates the effect of analytical skills on the work performance of project managers.

H5 (a): Emotional Intelligence positively moderates the effect of technical skills on the work performance of project managers.

THEORETICAL FRAMEWORK

By identifying the need of conducting studies on identifying the important skills and role of emotional intelligence on project managers' work performance, this research aims to investigate the project managers' attributes that affect their work performance. For this purpose, decision-making skills, analytical skills, technical competence, interpersonal skill, and communication skill have been taken as independent variables and their effect on work performance (dependent variable) was checked. Emotional intelligence has been taken as a moderating variable that can enhance or hinder the effect of skills on the work performance of project managers. The proposed research model is shown in figure 1.

Methodology

Research Design

There are two types of research designs or approaches that are commonly used. These are qualitative and quantitative research designs. This research is quantitative in its nature and analyses the impact of project manager's skills on project success with moderating role of emotional intelligence. The research design of this research is causal and tests the hypotheses which are based on the theoretical framework formed based on the review of existing literature.

Population and Sample

The population of the study was the software companies that undertake several projects in a year and their project success is very critical in nature. As it was not possible to select and study the whole population, hence, representative of the population in form of a sample was selected. Sample as the true representative of the population presents a true picture of the population to be studied. The technique which was used to collect the data from the respondent was convenient sampling. The sample size was two hundred. The sample consisted of software developers and managers who work on software projects.

Figure 1. Proposed research model
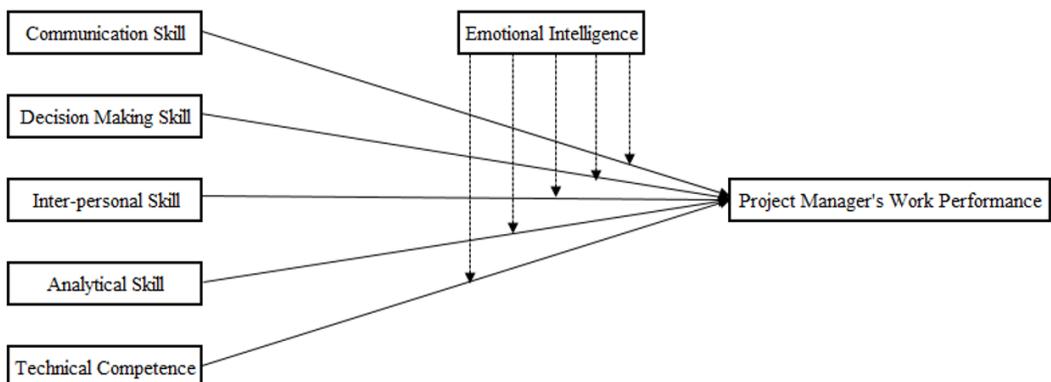
Research Instrument

The research instrument which we use to collect data was the adapted questionnaire based on five-point Likert scale. The questionnaire contains the item for every dependent, independent moderator variable. In the first section, there were questions regarding the demographic information of the respondent.

Validity and Reliability

As the entire research is based on one research instrument (questionnaire), it is essential to make sure that the instrument is giving valid and reliable results. When a questionnaire is used as a research instrument there is always a risk that the results are misinterpreted. The validating process ensures that information collected from an instrument is not unclear and also the results are in alliance with previous studies. To ensure the reliability of the questionnaire items a pilot study is conducted. Findings of the pilot study will identify if a need to change or remove items in the questionnaire is present.

A pilot study was conducted first to check the reliability of the instrument. The results of the pilot study helped to ensure reliability by conducting reliability analysis in Statistical Package for Social Sciences (SPSS) software. For the validity of the instrument, expert's opinions were taken to confirm the validity of the instrument.

Data Collection Method

For the collection of data, we used a combination of electronic and manual methods. For electronic data collection, we used Google documents, and questionnaires were distributed electronically with the help of social networking sites and emails. A field survey was conducted to approach the vast majority of the sample. A large scale of around 250 questionnaires was floated both manually and electronically. However, not all of them came back incorrect form. The questionnaires were administered to employees working in software houses.

Measurement Scale

- **Work Performance**

The 5 items scale of work performance was taken from the studies of (Kuvaas, 2006) and (Katavich, 2013). The item consisted of 5 points Likert scale where 5 strongly disagree, 4 disagree, 3 neutral, 2 agree and 1 was strongly agree.

- **Emotional Intelligence**

The 16 items scale of Emotional Intelligence was taken from the studies of (Wong and Law, 2002) and (Libbrecht et al., 2004). The item consisted of 5 points Likert scale where 5 strongly disagree, 4 disagree, 3 neutral, 2 agree and 1 was strongly agree.

- **Interpersonal Skills**

The 12 items scale of interpersonal skills was taken from the study of (Sunindijo & Zou, 2013). The item consisted of 5 points Likert scale where 5 strongly disagree, 4 disagree, 3 neutral, 2 agree and 1 was strongly agree.

- **Communication Skill**

The 10 item communication scale was adopted from the study of Valencia (2007) and Hatfield and Huseman (1982). The item consisted of 5 points Likert scale where 5 strongly disagree, 4 disagree, 3 neutral, 2 agree and 1 was strongly agree.

- *Decision-Making Skills*

The 9 items decision making skills was adopted from the study of Valencia (2007) and Foxall & Hackett (1992). The item consisted of 5 point likert scale where 5 strongly disagree, 4 disagree, 3 neutral, 2 agree and 1 was strongly agree.

- *Analytical Skills*

The 12 items scale of analytical skills was adopted from Valencia (2007), Pool (2006), and Conn and Rieke (1994). The item consisted of 5 point likert scale where 5 strongly disagree, 4 disagree, 3 neutral, 2 agree and 1 was strongly agree.

- *Technical Skills*

The 9 items technical skill scale was taken from the study of Valencia (2007) and Wagnor & Morse (1975). The item consisted of 5 point likert scale where 5 strongly disagree, 4 disagree, 3 neutral, 2 agree and 1 was strongly agree.

Results

The following section is about the statistical data analysis and results of all hypotheses using SPSS as a data analysis tool. It contains values of descriptive analysis, correlation analysis, reliability analysis, validity analysis, and hypotheses testing. Hypotheses were verified using a macro of (Preacher & Hayes, 2014).

Demographical Analysis

The demographic statistical values shown in table 1 depict that out of 240 sample sizes, 145 (60.4%) were males and 95 (39.6%) were females. From the age category, 63 (26.3%) respondents were at the age of 18-25, 94 (39.2%) were from 18-25, 61 (25.4%) were between 25-30 and only 13(5.4%) were above 30 years of age. Regarding qualification, 81 (33.8%) did bachelor's degree, 130 (54.2%) did master's degree and only 29 (12.1%) were having MS or above degree. About the experience, 115 (47.9%) were having less than 5 years of experience, 88 (36.7%) were having 6-10 years, and only 37(15.4%) were having 11-15 years of experience.

Correlation Analysis

The statistical values of mean, standard deviation and alpha values in table 2 indicate that mean value of work performance is (M=4.07, $S.D$=.795, $α$=0.72), Emotional Intelligence is (M=3.92, $S.D$=.791,$α$=0.79), communication skills are (M=3.97, $S.D$=.823, $α$=0.83), decision support skill and project success is (M=3.78, $S.D$=.833, $α$=0.79), analytical skills are (M=3.84, $S.D$=.850, $α$=0.83), technical skill (M=3.83, $S.D$=.921, $α$=0.81) and interpersonal skill are (M=3.72, $S.D$=1.02, $α$=0.80). Cronbach's alpha was employed for reliability analysis, and all recorded values fall within the acceptable range. (Taber, 2017).

Hypothesis Testing

According to literature analysis, theoretical relationships between variables were established. These relationships were tested using a statistical test. The statistical test conducted to check and confirm

Table 1. Demographic information of study respondents

Variable	Category	Frequency	Percentage
Gender	Male	145	60.4
	Female	95	39.6
Age	< 18	63	26.3
	18-25	94	39.2
	25-30	61	25.4
	Above 30 years	13	5.4
Study Level	Bachelors	81	33.8
	Masters	130	54.2
	MS	29	12.1
	Diploma	0	0
Experience	0-5 Years	115	47.9
	6-10 years	88	36.7
	11-15 Years	37	15.4
	Above 16 Years	0	0

Table 2. Correlation

Variables	1	2	3	4	5	6	7	M	S.D	α
Work Performance	1							4.07	.795	0.72
Emotional Intelligence	.468**	1						3.92	.791	0.79
Communication Skill	.426**	.311**	1					3.97	.823	0.83
Decision Makingt skill	.396**	.290**	.398**	1				3.78	.833	0.79
Analytical Skill	.221**	.267**	.214**	.456**	1			3.84	.850	0.83
Technical Skill	.462**	.400**	.208**	.325**	.247**	1		3.83	.921	0.81
Interpersonal Skill	.275**	.215**	.182**	.401**	.298**	.280**	1	3.72	1.02	0.80

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

the assumed relationship between variables was regression analysis using the bootstrapping method by using Process macro developed by Hayes and Preacher. In the theoretical model, a moderator was included; hence, moderation analysis was done to confirm the hypothesis.

As shown in table 3, in the first step, communication skills were regressed upon the work performed and the statistical values show that communication skills have ($b = .284, t = 5.26, p = .000$) a positive and significant effect on work performance. It means that one unit change in communication skill brings 28-unit change or increase in work performance of managers. In the next step, when emotional intelligence was tested upon the work performance, it was seen that emotional intelligence also has a positive and significant effect on work performance ($b = .34, t = 5.98, p = .000$). In the third step, an interaction term of communication skill and emotional intelligence was calculated, and it was found that emotional intelligence as a moderator also has a positive and significant effect on the work performance of managers ($b = .21, t = 0.64, p = .0009$). Hence, it positively moderates the relationship. Therefore, H1 and H1 (a) were proved.

Table 3. Impact of communication skill on work performance with moderating role of emotional intelligence

R	R^2	F	df1	df2	p
.5808	.3373	40.0372	3.0000	236.0000	.0000
	β	SE	t	p	
Communication Skill (CS)	.2845	.0541	5.2631	.0000	
Emotional Intelligence (EI)	.3403	.0569	5.9829	.0000	
Interaction term (CS x EI)	.2143	.0640	3.3472	.0009	

*R^2 change = 0.0315, F=11.2036, p=.0009 **Dependent Variable: Work Performance

H1: Effective communication skills have a significant positive effect on the work performance of project managers.

H1 (a): Emotional Intelligence positively moderates the effect of communication skills on the work performance of project managers.

To check the effect of effective decision-making skills on work performance, regression analysis was done (table 4). First, it was found that decision-making skills have a significant and positive impact on work performance ($b =.26$, $t = 4.72$, $p =.000$). In the next step, emotional intelligence was regressed upon work performance, and it was found that emotional intelligence is also having ($b =.38$, $t = 6.60$, $p =.000$) significant and positive effect on work performance. When an interaction term of decision-making skill and emotional intelligence as moderator was tested, it brought insignificant results ($b =-.081$, $t = -1.2$, $p =.218$). Therefore, H2 was accepted but H2(a) was not accepted.

H2: Effective decision-making skills have a significant positive effect on the work performance of the project manager.

H2 (a): Emotional Intelligence positively moderates the effect of decision-making skills on the work performance of project managers.

As shown in table 5, the interpersonal skill as independent variables was found to have a significant and positive effect on work performance ($b =.13$, $t = 2.98$, $p =.0031$). Emotional intelligence as the independent variable in this moderation analysis was also found to have a positive effect on work performance ($b =.43$, $t = 7.4$, $p =.000$). However, when an interaction term of moderator was entered, it also brought a positive moderating effect on work performance ($b = .23$, $t =.059$, $p =.0021$). Thus, Hypotheses H3 and H3(a) were accepted.

Table 4. Impact of decision making skill on work performance with moderating role of emotional intelligence

R	R^2	F	df1	df2	p
.5450	.2971	33.2471	3.0000	236.0000	.0000
	β	SE	t	p	
Decision Making Skill (DS)	.2602	.0551	4.7258	.0000	
Emotional Intelligence (EI)	.3802	.0576	6.6029	.0000	
Interaction term (DS x EI)	-.0811	.0657	-1.2338	.2185	

*R^2 change = .0045, F=1.5223, p=.002 **Dependent Variable: Work Performance

Table 5. Impact of interpersonal skill on work performance with moderating role of emotional intelligence

R	R²	F	df1	df2	p
.5054	.2554	26.9856	3.0000	236.0000	.0000
	β	SE	t	p	
Interpersonal Skill (IS)	.1345	.0451	2.9863	.0031	
Emotional Intelligence (EI)	.4308	.0578	7.4550	.0000	
Interaction term (IS x EI)	.2318	.0593	1.2109	.0021	

*R^2 change = .0046, *F*=1.466 , *p*=.0021, **Dependent Variable*: Work Performance*

H3: Effective interpersonal skills have a significant positive effect on the work performance of project managers.

H3 (a): Emotional Intelligence positively moderates the effect of interpersonal skills on the work performance of project managers.

As shown in table 6, in the order step, the analytical skill was regressed upon work performance of the manager and it brought (b =.92, t = 9.89, p =.000) a significant and positive impact on work performance. When emotional intelligence was regressed upon work performance, it also brought a significant and positive effect on work performance (b =.11, t = 1.99, p =.004). In the case of interaction in terms of analytical skill and work performance, it also brought a significant and positive effect on work performance. (b =.181, t = 1.9, p =.004). Therefore, emotional intelligence also positively moderates the relationship of analytical skill and work performance; hence, H 4 and H 4(a) were accepted.

H4: Effective analytical skills have a significant positive effect on the work performance of the project manager.

H4 (a): Emotional Intelligence positively moderates the effect of analytical skills on the work performance of project managers.

In the case of technical skills (table 7), it was found that technical skills are having a positive and significant effect on work performance, (b =.277, t = 5.37, p =.000). In the case of emotional intelligence, it is also having positive and significant effects on work performance (b =.34, t = 5.73, p =.000). When an interaction term of technical skills and emotional intelligence were regressed, it brought insignificant effects on work performance. Thus, H5 was accepted but 5(a) was rejected.

Table 6. Impact of analytical skill on work performance with moderating role of emotional intelligence

R	R²	F	df1	df2	p
.6805	.4630	67.8296	3.0000	236.0000	.0000
	β	SE	t	p	
Analytical Skill (AS)	.9217	.0932	9.8929	.0000	
Emotional Intelligence (EI)	.1181	.0591	1.9973	.00469	
Interaction term (AS x EI)	.1812	.0913	1.9853	.00483	

**R^2 change = .0090 , *F*=3.9414 , *p*=.00483, **Dependent Variable*: Work Performance*

Table 7. Impact of technical skill on work performance with moderating role of emotional intelligence

R	R²	F	df1	df2	p
0.5566	0.3098	35.3022	3.0000	236.0000	.0000
	β	SE	t	p	
Technical Skill (TS)	.2774	.0516	5.3751	0.000	
Emotional Intelligence (EI)	.3426	.0597	5.7378	0.000	
Interaction term (TS x EI)	-.0326	.0546	-.5970	0.551	

*R^2 change = .0010 , *F*=.3564 , *p*=.5511, **Dependent Variable*: Work Performance*

H5: Effective technical skills have a significant positive effect on the work performance of the project manager.

H5 (a): Emotional Intelligence positively moderates the effect of technical skills on the work performance of project managers.

DISCUSSION AND CONCLUSION

The study is aimed to investigate the effects certain managerial skills play in enhancing the work performance of project managers with moderating role of emotional intelligence. For this purpose, five-set of managerial skills were identified namely, communication skills, decision-making skills, interpersonal skills, analytical and technical skills that affect the work performance of project managers. The statistical results have found that effective communication skills have a significant positive effect on the work performance of project managers. The study also shows that emotional Intelligence positively moderates the effect of communication skills on the work performance of project managers. This finding shows that for the project manager, the ability to communicate effectively can significantly enhance his or her work performance and if he or she is emotionally intelligent, then the effect of communication skills on work performance would be greater. Because, an emotionally intelligent manager can better understand other people's feelings and attitudes, hence, he has a better capability to communicate with them regarding project needs and requirements. Hence, in the context of project management, communication skill in presence of emotional intelligence has been proven and effective skill.

The second hypothesis assumed that effective decision-making skills have a significant positive effect on the work performance of project managers and that emotional Intelligence positively moderates the effect of decision-making skills on the work performance of project managers. It was found that effective decision-making skills have a positive impact on the work performance of project managers; however, the moderating role of emotional intelligence was not proven in this case. This indicates that decision making skill is necessary for the project manager because, over a short span and temporary nature of the project, managers need to make multiple decisions in many circumstances. Effective decision-making skills can save projects from many discrepancies and loopholes. As the project manager is accountable and answerable for his project success; hence, he has to make effective decisions for better performance.

In the third hypothesis, it was assumed that effective interpersonal skills have a significant positive effect on the work performance of project managers and that emotional intelligence positively moderates the effect of interpersonal skills on the work performance of project managers. The results confirmed that effective interpersonal skills in presence of emotional intelligence can effectively enhance the work performance of project managers. Interpersonal skills are concerned with handling people in teams and who are under the supervision of project managers in different positions. Again here, if a project manager understands about emotions, feelings, and opinions of other, he would be

better able to keep healthy relations with them. Hence, emotional intelligence is an added feature or characteristic of a project manager that can help the project manager maintain good interpersonal skills and ultimately enhance work performance.

In the fourth hypothesis, effective analytical skills were found to have a significant positive effect on the work performance of project managers, and it was also confirmed that emotional Intelligence positively moderates the effect of analytical skills on the work performance of project managers. In the context of the software industry, producing or programming any part of software contains a human element of soft skills like problem-solving and analytical thinking, etc.

In the fifth hypothesis, effective technical skills were found having a significant positive effect on work performance of project manager where emotional Intelligence having a moderating effect on the relationship of technical skills on work performance of project managers were rejected. Technical skills are having knowledge of his or her job aspect and in the case of the software industry, software programmers require a high level of technical skills of programming, here emotional intelligence did not produce the desired result. It seems logical because the technical skill of programming doesn't have any effect on work performance in the presence of emotional intelligence. However, single technical skills do affect work performance because the more skilled person can perform his or her work efficiently and effectively.

Software development is not a show of one man, instead, it is composed of teams, and teams consist of different personality styles of people, hence, to understand the diversity in teams, project managers must have soft skills. Of these soft skills, communication, analytical and interpersonal are those that directly deal with people-to-people relations, and here emotional intelligence can play an important role in strengthening it. Normally, communication skills are given more importance, and rest is ignored (Ahmed, et al., 2013).

The software developer interprets the plan into a program, an assignment that requires comprehension of the necessities, plan and further quickens the necessities of good relational abilities. The software business values relational abilities of interpersonal, communication, and analytical skills because it impacts on work performance of managers. The capacity to impart successfully is sought after in the activity showcase.

Software advancement is critical thinking calling in which the client requires an issue to be translated into a computer program by a software developer, hence, analytical and problem-solving skills and critical thinking aptitudes implies that one can view and investigate a circumstance from an extremely legitimate, precise point of view and concoct an answer fitted to the situation. At the point when individuals are associating in groups, they have diverse conclusions and styles. This raises the likelihood of disputes among group individuals which can later influence the effectiveness of the group. Constructive relational aptitudes or interpersonal skills of project managers with group members increase the efficiency of the association since the number of disagreements is decreased and trust expanded. A few jobs of the product advancement stage additionally require association outside the limit of the work teams. For example, the key job of software experts requires associating with clients who may not be sufficiently capable of accumulating and expand the prerequisites of the order. The job of software manager requires a decent arrangement of relational aptitudes to deal with the circumstances.

In the procedure of programming improvement every job, to a specific degree, needs to settle on decisions that specifically affect the software programming cost, quality, and profitability. While he or she is making decisions, a few decisions are difficult and take vigilant ideas and thoughts. With the enhancing of programming innovation and the level of project management, the success of software programming projects is not an extraordinary case. However, this does not mean that software development is an easy task, as it has gained a lot of attention across the world. Therefore, working on the improvement of soft skills among project managers is necessary. If an individual or employee has a high level of technical skills and is talented in a particular task, he will be esteemed

by his organization, which will without a doubt see them perform well. Hence, technical skills may increase work performance.

IMPLICATIONS

There is a growing trend of online business and software requirements, therefore, possession of necessary skills for managers and software developers is required. This study conducted on managerial skills and their effects on work performance of managers in the presence of emotional intelligence is of significant nature. The finding of this study will help managers to have a view on the Project Manager's necessary skills that can affect their project outcome or success. This study will help project organizations and managers to understand the relationship between managerial skills and their work performance and it will also help to understand the importance of developing certain skills and the necessary programs for developing those skills among project managers.

Along with technical skills, managers must also consider these managerial skills. The results suggest the following implications:

- The human resource and training and development section of organizations should invest in developing such project management skills and personal characteristics in managers so that they can have an improvement in project result and ultimately organization results.
- There can be on the job training for software developers/managers to assess the outcome of these skills as well as developing these skills.
- Universities should also focus on or revise their curriculum to cater to the need for such managerial skills necessary for project performances.
- Theoretically, the findings of this study will add to the body literature in both project management and information systems as well as to the body of human resource management. Researchers may take the results and framework of this study for further in-depth exploration of the effects of different managerial skills across different industries and genders and occupations.

Overall, the results of this research could be used by

- To guide policies about recruiting software project managers.
- To set the direction for policy about academic curricula.
- To prepare organizational training programs for software managers in organizations and universities.

Limitations

Few limitations of the study are observed as:

- The sample is limited to the only software industry that has problems in limiting the generalizability of results.
- The sample is also limited to only a few cities in Pakistan.
- The study is conducted on a small sample size
- The method of inquiry is only quantitative.

CONCLUSION

The study has found some of the vital issues faced by the management side in the software industry, i.e. requisites of managerial skills to become an effective project manager. The results found that there

is a need to pay attention to these managerial soft skills among project members. The study found that all types of managerial skills are important for the effective performance of project managers in the software industry. Accomplishing such a variety of managerial skills would empower us to bring a lavishness of ability and perspectives to tolerate upon the multifaceted nature of the software industry. In a multi-cultural global environment, possession and development of such managerial skills are of great significance in gaining trust and increasing our customer base in the software industry. The software industry was highly dominated by only technical skills, however, as indicated in this research and the growing trend of project management across the globe, it is evident that the project management role cannot be succeeded only with technical skills, and other sets of additional traits and skills are necessary.

The results of this study have opened a way for future research on managerial skills and their effect on project performance in the software industry. Future studies can be conducted by including gender as a differentiated variable and check the effects of managerial skills on work performance across both males and females. Future research can be extended to other sectors or industries, as this was limited to the only software industry. Future studies can also be conducted longitudinally to check the process of managerial skills development over the period. Future studies can also conduct mixed-method research comprising both quantitative and qualitative research.

REFERENCES

Aasheim, C., Shropshire, J., Li, L., & Kadlec, C. (2012). Knowledge and skill requirements for entry-level IT workers: A longitudinal study. *Journal of Information Systems Education*, *23*(2), 193–204.

Abas-Mastura, M., Imam, O. A., & Osman, S. (2013). Employability skills and task performance of employees in the government sector. *International Journal of Humanities and Social Science*, *3*(4), 150–162.

Al-Ahmadi, H. (2011). Challenges facing women leaders in Saudi Arabia. *Human Resource Development International*, *14*(2), 149–166. doi:10.1080/13678868.2011.558311

Ali, M., Li, Z., Khan, S., Shah, S. J., & Ullah, R. (2021). Linking humble leadership and project success: The moderating role of top management support with mediation of team-building. *International Journal of Managing Projects in Business*, *14*(3), 545–562. doi:10.1108/IJMPB-01-2020-0032

Alvarenga, J. C., Branco, R. R., Guedes, A. L. A., Soares, C. A. P., & da Silveira, W. (2019). The project manager core competencies to project success. *International Journal of Managing Projects in Business*, *13*(2), 277–292. doi:10.1108/IJMPB-12-2018-0274

Ana Karen Ballesteros, K. A., & Chavarria, F. (2015). *Effective Project Manager the Role of the Professional Bodies of Knowledge and Formal Education Providers in the development of soft skills.* Umeå School of Business and Economics.

Anantatmula, V. S. (2010). Project Manager Leadership Role in Improving Project Performance. *Engineering Management Journal*, *22*(1), 13–22. doi:10.1080/10429247.2010.11431849

Avença, I., Domingues, L., & Carvalho, H. (2023). Project Managers soft skills influence in knowledge sharing. *Procedia Computer Science*, *219*, 1705–1712. doi:10.1016/j.procs.2023.01.464

Ballesteros, A. K., & Chavarria, F. (2016). *Human Competencies of an Effective Project Manager: The role of the Professional Bodies of Knowledge and Formal Education Providers in the development of soft skills* [Master Thesis]. Umeå School of Business and Economics.

Ballesteros-Sánchez, L., Ortiz-Marcos, I., & Rodríguez-Rivero, R. (2019). The impact of executive coaching on project managers' personal competencies. *Project Management Journal*, *50*(3), 306–321. doi:10.1177/8756972819832191

Bateman, T. S., & Zeithaml, C. P. (1990). *Management: Function and Strategy*. Irwin.

Brill, J. M., Bishop, M. J., & Walker, A. E. (2006). The competencies and characteristics required of an effective project manager: A web-based Delphi study. *Educational Technology Research and Development*, *54*(2), 115–140. doi:10.1007/s11423-006-8251-y

CEDA. (2015). *Australia's Future Workforce?* Committee for Economic Development Australia.

Chen, T., Fu, M., Liu, R., Xu, X., Zhou, S., & Liu, B. (2019). How do project management competencies change within the project management career model in large Chinese construction companies? *International Journal of Project Management*, *37*(3), 485–500. doi:10.1016/j.ijproman.2018.12.002

Cheng, M. I., Dainty, A. R., & Moore, D. R. (2005). What makes a good project manager? *Human Resource Management Journal*, *15*(1), 25–37. doi:10.1111/j.1748-8583.2005.tb00138.x

Christ, T., Arya, P., & Chiu, M. (2012). Collaborative Peer Video Analysis: Insights about Literacy Assessment and Instruction. *Journal of Literacy Research*, *44*(2), 171–199. doi:10.1177/1086296X12440429

Clarke, N. (2010). Emotional intelligence and its relationship to transformational leadership and key project manager competencies. *Project Management Journal*, *41*(2), 5–20. doi:10.1002/pmj.20162

Coffelt, T. A., Grauman, D., & Smith, F. L. (2019). Employers' perspectives on workplace communication skills: The meaning of communication skills. *Business and Professional Communication Quarterly*, *82*(4), 418–439. doi:10.1177/2329490619851119

Denney, V., Haley, G., Rivera, E., & Watkins, D. V. (2020). Project management leadership and interpersonal skills: The past, present, and future. *Global Journal of Management and Marketing*, *4*(1), 135–148. doi:10.47177/GJMM.04.01.2020.135

Dholakia, D. (2023, September 22). *A Detailed Guide To Data Analytics for Project Management*. IIM SKILLS. Retrieved from https://iimskills.com/data-analytics-for-project-management/

Ebad, S. A. (2016). Influencing factors for IT software project failures in developing countries-a critical literature survey. *JSW*, *11*(11), 1145–1153. doi:10.17706/jsw.11.11.1145-1153

Evans, J. S. B. (2003). In two minds: Dual-process accounts of reasoning. *Trends in Cognitive Sciences*, *7*(10), 454–459. doi:10.1016/j.tics.2003.08.012 PMID:14550493

Fisher, E. (2011). What practitioners consider to be the skills and behaviors of an effective people project manager. *International Journal of Project Management*, *29*(8), 994–1002. doi:10.1016/j.ijproman.2010.09.002

Howard, B. (1999). *Project Management for Building Designers and Owners*. CRC Press.

Hwang, B. G., & Ng, W. J. (2013). Project management knowledge and skills for green construction: Overcoming challenges. *International Journal of Project Management*, *31*(2), 272–284. doi:10.1016/j.ijproman.2012.05.004

Hwang, G., & Wei Jian Ng, J. W. (2013). Project management knowledge and skills for green construction: Overcoming challenges. *International Journal of Project Management*, *31*(2), 272–284. doi:10.1016/j.ijproman.2012.05.004

Javadzadeh, S. A., Mazidi, A., & Aghaei, A. (2016). The Relationship between Effective Communication Skills of Managers and Creativity of Staff. *Journal of Management Sciences*, *2*(5), 274–277.

Jena, A., & Satpathy, S. S. (2017). Importance of soft skills in project management. *International Journal of Scientific Research and Management*, *5*(7), 6173–6180. doi:10.18535/ijsrm/v5i7.45

Ju, X., Ferreira, F. A., & Wang, M. (2020). Innovation, agile project management and firm performance in a public sector-dominated economy: Empirical evidence from high-tech small and medium-sized enterprises in China. *Socio-Economic Planning Sciences*, *72*, 100779. doi:10.1016/j.seps.2019.100779

Kerzner, R. H. (2010). *Project Management - Best Practices: Achieving Global Excellence*. Wiley Sons.

Khan, S. U. R., Long, C. S., & Iqbal, S. M. J. (2014). Authentic Leadership: An Emerging Issue in Project Management. *Research Journal of Applied Sciences, Engineering and Technology*, *8*(11), 1377–1383. doi:10.19026/rjaset.8.1110

Langer, N., Slaughter, S. A., & Mukhopadhyay, T. (2008). Project managers' skills and project success in IT outsourcing. *ICIS 2008 Proceedings*, 147.

Langlo, J. A. (2013). *Communication in Projects*. Lecture slides from the course Project Planning & Control at NTNU.

LaVoi, N. M. (2007). Interpersonal communication and conflict in the coach-athlete relationship. *Social psychology in sport*, 29-40.

Lechler, T. (1998). When it comes to project management, it's the people that matter: an empirical analysis of project management in Germany. *Project Management Journal*, *41*(2), 5–20.

Lipsanen, P. (2017). *The leadership role of the project manager in an international project* [Bachelor thesis]. Munich University of Applied Sciences Faculty of Business Administration Degree Program in International Business. Accessed from https://www.theseus.fi/bitstream/handle/10024/144225/Lipsanen_Penni.pdf?sequence=1

Liu, X. Y., & Liu, J. (2013). Effects of team leader emotional intelligence and team emotional climate on team member job satisfaction: A cross-level. *Nankai Business Review International*, *4*(3), 180–198. doi:10.1108/NBRI-07-2013-0023

Lussier, R. N., & Achua, C. F. (2010). *Leadership: Theory, application, & skill development* (5th ed.). South-Western.

Lynch, E., Smith, J., & McLennan, A. (2021, January). Comparison of interpersonal skill competency for Australian graduate and experienced engineer frameworks. In *REES AAEE 2021 conference: Engineering Education Research Capability Development: Engineering Education Research Capability Development* (pp. 543–551). Engineers Australia.

Lyu, W., & Liu, J. (2021). Soft skills, hard skills: What matters most? Evidence from job postings. *Applied Energy*, *300*, 117307. doi:10.1016/j.apenergy.2021.117307

Mandson, L., & Selnes, M. (2015). *Project management efficiency and effectiveness to improve project control in public sector* [Master Thesis]. Department of Industrial Economics and Technology Management. Retrieved from https://brage.bibsys.no/xmlui/bitstream/handle/11250/2352870/14043_FULLTEXT.pdf?sequence=1

Maqbool, R., Sudong, Y., Manzoor, N., & Rashid, Y. (2017). The impact of emotional intelligence, project managers' competencies, and transformational leadership on project success: An empirical perspective. *Project Management Journal*, *48*(3), 58–75. doi:10.1177/875697281704800304

Mayer, J. D., Roberts, R. D., & Barsade, S. G. (2008). Human abilities: Emotional intelligence. *Annual Review of Psychology*, *59*(1), 507–536. doi:10.1146/annurev.psych.59.103006.093646 PMID:17937602

Mehran, N., Shahram, S., & Hossein, S. (n.d.). Relationship between Communication Skills and Effectiveness. *International Journal of Basic Sciences & Applied Research, 1*(4), 101-106.

Moradi, S., Kähkönen, K., & Aaltonen, K. (2020). Project managers' competencies in collaborative construction projects. *Buildings*, *10*(3), 50. doi:10.3390/buildings10030050

Moura, R. L. D., Carneiro, T. C. J., & Diniz, B. D. (2017). Influence of the project manager's personal characteristics on project performance. *Gestão & Produção*.

Nicholas, J. M., & Steyn, H. (2020). *Project management for engineering, business and technology*. Routledge. doi:10.4324/9780429297588

Nishtha Langer, N., & Slaughter, S. (2008). How do Project Managers' Skills Affect Project Success in IT Outsourcing? Indian School of Business, College of Management, Georgia Institute of Technology.

Nor, N. A. M., Yusof, Z. Y., & Shahidan, M. N. F. (2011). University of Malaya dental students' attitudes towards communication skills learning: Implications for dental education. *Journal of Dental Education*, *75*(12), 1611–1619. doi:10.1002/j.0022-0337.2011.75.12.tb05222.x PMID:22184601

Obradovic, M., Lal, A., & Liedgens, H. (2013). Validity and responsiveness of EuroQol-5 dimension (EQ-5D) versus Short Form-6 dimension (SF-6D) questionnaire in chronic pain. *Health and Quality of Life Outcomes*, *11*(1), 110. doi:10.1186/1477-7525-11-110 PMID:23815777

Pang, E., Wong, M., Leung, C. H., & Coombes, J. (2019). Competencies for fresh graduates' success at work: Perspectives of employers. *Industry and Higher Education*, *33*(1), 55–65. doi:10.1177/0950422218792333

Peterson, D. K. (2004). Benefits of participation in corporate volunteer programs: Employees' perceptions. *Personnel Review*, *33*(6), 615–627. doi:10.1108/00483480410561510

Posner, B. Z. (1987). What it takes to be a good project manager. *Project Management Journal*, *18*(1), 51–54.

Qu, G., Shen, L., & Bao, X. (2014). Vendors' team performance in software outsourcing projects: From the perspective of transactive memory systems behavioral characteristics. *Nankai Business Review International*, *5*(3), 290–308. doi:10.1108/NBRI-02-2014-0013

Radecki, C. M., & Jaccard, J. (1996). Gender-Role Differences in Decision-Making Orientations and Decision-Making Skills 1. *Journal of Applied Social Psychology*, *26*(1), 76–94. doi:10.1111/j.1559-1816.1996.tb01839.x

Rue, L., & Byars, L. (2009). *Management* (13th ed.). McGraw-Hill/Irwin.

Salovey, P., & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition and Personality*, *9*(3), 185–211. doi:10.2190/DUGG-P24E-52WK-6CDG

Samovar, L. A., & Mills, J. (1995). *Oral communication: Speaking across cultures* (9th ed.). Brown & Benchmark.

Shastri, Y., Hoda, R., & Amor, R. (2021). The role of the project manager in agile software development projects. *Journal of Systems and Software*, *173*, 110871. doi:10.1016/j.jss.2020.110871

Slipicevic, O., & Masic, I. (2012). Management knowledge and skills required in the health care system of the federation Bosnia and Herzegovina. *Materia Socio-Medica*, *24*(2), 106. doi:10.5455/msm.2012.24.106-111 PMID:23922519

Srića, V. (2009). Harmony Based Leadership and New Values in Management. *BALAS Conference*, Barcelona, Spain.

Sunindijo, R. Y. (2015). Project manager skills for improving project performance. *International Journal of Business Performance Management*, *16*(1), 67–83. doi:10.1504/IJBPM.2015.066041

Sunindijo, R. Y., & Zou, P. X. (2011). Political skill for developing construction safety climate. *Journal of Construction Engineering and Management*, *138*(5), 605–612. doi:10.1061/(ASCE)CO.1943-7862.0000482

Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, *48*(6), 1273–1296. doi:10.1007/s11165-016-9602-2

Tan, T., Mills, G., Papadonikolaki, E., & Liu, Z. (2021). Combining multi-criteria decision making (MCDM) methods with building information modelling (BIM): A review. *Automation in Construction*, *121*, 103451. doi:10.1016/j.autcon.2020.103451

Valencia, V. V. (2007). *A project manager's personal attributes as predictors for success* [Master Thesis]. Department Of The Air Force Air University Air Force Institute Of Technology.

World Federation of Engineering Organizations. (2021). *Committee on Education in Engineering (CEIE) - GAPC Consultation*. Retrieved August 6, 2022, from http://www.wfeo.org/wfeo-ceiegapc-consultation/

Xiong, R. (2008). *Leadership in project management* [Master's dissertation]. Georgia Institute of Technology.

Yi, L., & Zulaikha, N. (2022). The influence of leadership skills on organizational management: A conceptual review. *International Journal of Behavioral Analytics*, *2*(4), 1–7.

Zaman, U., Jabbar, Z., Nawaz, S., & Abbas, M. (2019). Understanding the soft side of software projects: An empirical study on the interactive effects of social skills and political skills on complexity–performance relationship. *International Journal of Project Management*, *37*(3), 444–460. doi:10.1016/j.ijproman.2019.01.015