

# Systematic review of the most relevant competencies for projects managers in the construction industry

Revisión sistemática de las competencias más relevantes para los directores de proyectos en la industria de la construcción

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*Construction organisations are now focusing on ensuring that project managers acquire the core competencies they require to be successful in their assignments. An organisation can maximise its probabilities of consistent project success by recruiting, developing, nurturing and retaining skilled project managers. Working closely with a range of other professionals, project managers organise, plan, schedule and control work and are responsible for ensuring that the project is completed within established time and cost constraints. To manage the project professionally and successfully, a project manager must possess the necessary skills and knowledge. An extensive evaluation on the essential and relevant skills of project managers was carried out in order to analyse the most important skills. The past few decades have produced a number of investigations into the correlation between project managers' competencies and project success. As a result, competencies lists have become too extensive, and the field is in constant change; therefore, this study updates the discussion and downsizes the number of competencies to fewer, more relevant items. Communication capabilities are a necessity for a project manager to be as effective as possible. The ability to lead the team, solve problems and handle conflicts, while being result-oriented and team-oriented, are a must for project managers. To achieve project goals, a project manager needs a range of additional skills, including organisation, emotional intelligence, technical expertise and interpersonal relationship skills.*

**Keywords:** project management, relevant competencies, construction industry, communication, organisation

*Las empresas constructoras se están enfocando en garantizar que los gerentes de proyectos adquieran las competencias principales que necesitan para tener éxito en sus labores. Una empresa puede maximizar sus probabilidades de éxito permanente en sus proyectos mediante la contratación, el desarrollo, la formación y la retención de gerentes de proyectos capacitados. Al trabajar en estrecha colaboración con una variedad de otros profesionales, los gerentes de proyecto organizan, planifican, programan y controlan el trabajo y son responsables de garantizar que el proyecto se complete dentro de los límites de tiempo y costos establecidos. Para gestionar el proyecto de forma profesional y exitosa, un director de proyecto debe poseer las habilidades y conocimientos necesarios. Se llevó a cabo una evaluación exhaustiva sobre las habilidades esenciales y relevantes de los directores de proyectos con el fin de analizar las habilidades más importantes. Las últimas décadas han producido una serie de investigaciones sobre la correlación entre las competencias de los directores de proyectos y el éxito de los mismos. Como resultado, las listas de competencias se han vuelto demasiado extensas y el campo está en constante cambio; por lo tanto, este estudio actualiza la discusión y reduce el número de competencias a menos elementos y más relevantes. Las capacidades de comunicación son una necesidad para que un director de proyecto sea lo más eficaz posible. La capacidad de liderar el equipo, resolver problemas y manejar conflictos, al mismo tiempo que estar orientado a resultados y al equipo, es imprescindible para los gerentes de proyectos. Para lograr los objetivos del proyecto, un gerente de proyecto necesita una variedad de habilidades adicionales, que incluyen organización, inteligencia emocional, experiencia técnica y habilidades para las relaciones interpersonales.*

**Palabras clave:** gestión de proyectos, competencias relevantes, industria de la construcción, comunicación, organización

## Introduction

Successful construction organizations now focus on ensuring that project managers acquire the core competencies required to be successful in their assignments. According to Toney (2001), the project manager has direct influence over 34–47% of project success. Ahadzie (2007) also confirmed the industry's growing awareness of the relationship between achieving project success and the competencies of the construction project manager. Based on these studies, it is clear that project managers play an important role in determining the success of a project.

An organization can maximize its probability of consistently attaining project success by recruiting, developing, nurturing and retaining skilled project managers. Working closely with a range of other professionals, project managers organize, plan, schedule, and control the work and are responsible for getting the project completed within established time and cost limitations (Sears *et al.*, 2008). To manage the project professionally and successfully, a project manager needs to possess the required skills and knowledge.

Widespread research studies have documented managerial skills necessary for efficient project performance. Social skills, decision-making skills, problem-handling skills, ability to recognize opportunities, and management of changes as key personal attributes affecting project success have been listed (Fryer, 2004; Crisóstomo y Herrera, 2018). Given the fast-changing environment of the construction industry with challenges such as skills shortages, the rapid advancement of information and communication technologies, and the increasing prioritization of issues such as sustainability, environmental protection and climate change, the role of the project manager needs to be adapted (Hwang and Ng, 2013).

As the industry changes, project managers find themselves confronted by new issues and must undertake roles that have not traditionally been part of their responsibility (Edum-Fotwe and McCaffer, 2000). Both Ceran and Dorman (1995) and Russell *et al.* (1997) recognized the changing role of construction project managers and argued that they must supplement their traditional functions with non-engineering knowledge and skills to meet today's professional demands. Today's project manager fulfils

not only traditional roles of project management but also must manage the project in the most efficient and effective manner with respect to sustainability.

Project managers need to have competency in those areas that will have the greatest impact on successful outcomes, as well as competency in those areas that are critical to successful delivery (Crawford, 2000). The main purpose of providing a new definition is to help gain access to an improving mindset they could use as a framework (Ghorbani, 2023).

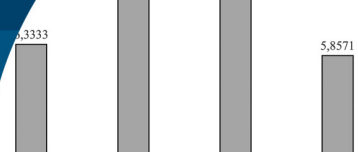
Construction project managers face complex tasks in day-to-day basis; thus, they need essential skills to manage these tasks. Projects and project-based management, delivered nationally and internationally, are of significant importance to organizations. Increasing understanding of the essential skills in project management, therefore, is of critical importance.

The past few decades have produced a number of investigations into the correlation between project managers' competencies and project success. As a result, competencies lists have become too extensive, and the field is in constant change; therefore, this study updates the discussion and downsizes the number of competencies to fewer, more relevant items.

A key significant contribution of this paper is the literature review of journals and books on project manager's skills when engaged in construction projects not sufficiently explored within the project management body of knowledge. The overall intent is to propose a set of skills that is applicable in the construction industry, highlighting and identifying the valuable skills of project managers so that the values and benefits of these skills can be adapted in current practices to successfully deliver such projects.

## Methodology

The information collected was obtained from different sources such as specialized journals, books, conference proceedings and thesis about project management. The websites used for the research were Web of Science, Science Direct, Google Scholar, and Research Gate. The research was conducted on January, 2024. The key phrases used to begin the research were “project managers competencies”, “project managers skills” and “successful projects”. The



mentioned websites returned 17800 results for these key phrases. To filter the existing literature, we read the abstracts, conclusions and the keywords of each source. The papers had to be focused on the competencies of the project manager in the project's success. Additionally, the papers required to be based on surveys, experts' judgement or previous literature reviews to be considered for this work. Once the relevant literature was identified, we collected a total of 29 studies that were aligned to this work scope.

## Literature review

An in-depth analysis of the existing literature on the subject of the required and relevant skills of project managers was carried out in order to produce a summary of the most important skills according to various authors.

Zimmerer and Yasin (1998) stated that organizational effectiveness requires project managers to combine their technical competency with the ability to develop and display leadership. The results clearly and unequivocally identify negative leadership as the cause of project failure (Czuchry and Yasin, 2003). Therefore, organizational effectiveness requires project managers to combine their technical competency with the application of proven project management tools that support project planning and control, and the need to practice leadership skills that are compatible with the internal motivation of the project team and externally compatible with client focus strategies. The abilities that a project manager needs to develop are: team building, communication, high self-esteem, results focused, trustful, goal setter, demonstration of respect, flexibility for changes, team player and employee developer.

The development of construction project managers and how they maintain their professional skills in a changing construction business environment have been presented by Edum-Fotwe and McCaffer (2000) and Aggiag (2005). It identifies the general knowledge and skill elements that are perceived as essential for developing project management competency through a survey of project managers in the construction industry. The primary knowledge and skill elements for developing PM competency are: technical skill (planning and scheduling, basic technical knowledge in own field), managerial skill (leadership, delegation,

negotiation, decision making, motivation and promotion, team working), financial skill (establishing budgets, reporting systems), legal skills (drafting contracts), communication skill (presentation, general and business correspondence), general skills (chairing meetings) (European Construction Institute, 2011).

Bedingfield and Thal (2008) concluded that personality is a predictor of Project Manager (PM) success. After surveying students in Defence Acquisition University courses by collecting Big Five personality data on the Best and Least Successful PMs they have known, analysis was conducted using difference of the means tests and by building a hierarchical model. In particular, a difference of the means *t*-test between Good and Least Successful PMs indicates both Conscientiousness ( $n = 34, t = 3.719, p = 0.001$ ) and Openness ( $n = 34, t = 3.438, p = 0.002$ ) are positive predictors. While Emotional Stability was not significant in the hierarchical model, Emotional Stability did demonstrate significance in the difference of the means test. As a result, the relationship between personality and PM success was more clearly described. The most important subfactors are: competence, order, dutifulness, achievement striving, self-discipline, deliberation, creativity and curiosity.

Geoghegan and Dulewicz (2008) found that there are 10 leadership dimensions that correlate leadership dimensions and project success through a Leadership Dimensions Questionnaire. These findings highlight a link between managerial competencies and project success. The Managerial leadership dimensions seem to play a significant role in influencing or affecting project success. According to Dulewicz and Higgs (2000), emotional intelligence can explain variations in the performance of managers and other staff. This research found that both managerial and emotional/social competencies could explain variations in project success. Therefore, identifying such relationships provides a possible project improvement model where increased capability in a leadership dimension can lead to increase success in project's implementation. The leadership dimensions are resource management, empowerment, development, motivation, critical analysis, influence, self-awareness and sensitivity. Sunindijo and Zou (2011) reviewed sixteen previous studies on essential skills from the general management, project management

and construction project management literature. Then, a new set of essential skills namely conceptual, human, political, and technical skill (CHPT construct) was proposed for construction project managers to achieve project success. A key contribution of this research is the inclusion of political skill as one of essential skills for construction project managers (Ballesteros-Sánchez *et al.*, 2019).

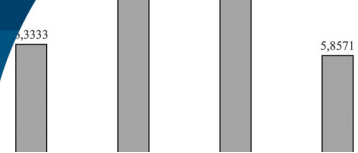
This research argues that there are three components that form the conceptual skill construct namely visioning, scoping, and integration. There are three vital components of human skill construct namely emotional intelligence, interpersonal skill, and leadership. Ferris *et al.* (2007) proposed four key dimensions of the political skill construct namely social astuteness, interpersonal influence, networking ability, apparent sincerity. Finally, there are six technical skills essential for construction project managers as follow: scheduling, budgeting and cost management, quality management, document and contract administration, risk management and procurement management. Nixon *et al.* (2012) explored how performance of leadership in project management determines project outcomes. They concluded that project managers need to prioritize training in leadership skills, and the need for continuous professional improvement to enhance leadership outcomes. Furthermore, since leadership is a leading behavioural trait exhibited in effective managers, it is entirely plausible that leadership performance, and lack of performance management, can be a significant cause in project success or failure. A successful project manager needs to develop his or her leadership, self-confidence, technical knowledge, problem-solving ability, results orientation, energy and initiative, perspective, communication and negotiating ability.

Chipulu *et al.* (2013) explored the key competences employers require from PMs across multiple industry sectors and the salience placed on each dimension by different sectors. They found that industry puts more weight on generic skills than project management knowledge/expertise. They also concluded that there is demand in industry for PMs with “managerial skills” who are able to manage not only complex project environments but are also commercially aware, i.e., have the capacity to manage (on behalf of the organization) threats and opportunities

presented by the business environment outside projects. The abilities that a project manager needs to develop are: technical skills, communication, team managing, leadership, budgets management, risk management, planning, quality management, experience, drive difficult work and flexibility. Creasy and Anantatmula (2013) researched the scope of personality dimensions and their subsequent effects on project success and, second, considers dimensions heretofore not explored within the project management body of knowledge. They posited that a project manager’s extent of communication apprehension, degree of innovativeness, level of self-monitoring, conflict management style, degree of change orientation and Myers - Briggs (MBTI) personality type can affect project outcomes. Additionally, they conjectured those organizational dynamics such as structure, incentive systems, and organizational project management maturity can moderate the relationship between these personality dimensions and project success.

The relationship between behavioural and managerial competency profiles of Project Managers (PMs) and project success has been examined in a holistic approach using a structured questionnaire by Trivellas and Drimoussis (2013). Fifteen critical behavioural competency elements were taken into account (leadership, engagement and motivation, self-control, assertiveness, relaxation, openness, creativity, results orientation, efficiency, consultation, negotiation, conflict and crisis, reliability, values appreciation, ethics). Results reveal that PMs equipped with a broader competency repertoire characterized by high levels of behavioural, managerial and emotional competencies enjoy greater project’s success. Hwang and Ng (2013) aimed to identify challenges faced by project managers who execute green construction projects and to determine the critical knowledge areas and skills that are necessary to respond to such challenges. Having carried out a comprehensive literature review on the essential knowledge and skills required for competent project managers who execute green projects, 20 knowledge and skill areas were selected and a total of 52 completed survey questionnaires were received, tabulated and analysed. The most important skills that are required to mitigate the challenges in managing green construction projects are decision-making, delegation, analytical, team





working, problem-solving and leadership skills.

Giraldo *et al.* (2013) developed a study to describe and evaluate the characteristics (educational background, training, skills, and experience) that make up the project manager profile in the construction sector in Bogotá, Colombia. This study is based on a project management literature review, expert interviews and surveys with a group of 153 project managers in the construction sector, and comparisons between them. Leadership is the most important skill and characteristic recognized by the project managers interviewed, followed by ethics, decision making, analytical skills, and teamwork. Zhang *et al.* (2013) focused on “soft” skills, especially social competencies in the construction context. This study has adopted a well-established competency model from human resource management theories as a basis for the theoretical framework to examine the social competencies of construction project managers. This led to the development of a model via the use of a structural equation modelling approach. Four dimensions of social competencies for construction project managers were identified, i.e., working with others, stakeholder management, leading others, and social awareness. Among these soft skills, working with others (conflict management, teamwork and cooperation) and leading others (interpersonal understanding, inspirational leadership) were perceived comparatively more important than other social competencies. Ahsan *et al.* (2013) addressed the competencies organizations use through project manager job advertisements. They developed a list of project manager job competencies; break down the competency components into knowledge, skills, and abilities; and conduct a comparative analysis of the use of these competencies. They examined the online contents of 762 project manager job advertisements in the public domain. Analysis shows that industry job advertisements emphasize “soft skills” and competencies in a manner different than that in the literature. Additionally, differences are found across countries and among industries. Enterprises are mostly looking for project managers with good ‘communication’ skills that cover sub-categories such as reporting, presenting, relations management, and interpersonal skills. Technical skill and Stakeholder Management were identified as the second and third most sought after competency.

Montequin *et al.* (2015) carried out by means of a survey addressed to project management practitioners of different countries. This questionnaire was developed based on Jung’s personality theory. Seventy-eight responses were collected from project managers with a minimum experience of 3 or more years in different fields or industries. Out of these data, it was concluded that most successful project managers have common core traits as extroversion, rational judging and structured behaviours. The preferred managerial profile for successful project managers (i.e., practitioners who most frequently obtain successful results in the projects they manage) would be an individual who possesses a high-level and long-term view, is a fair and firm person, makes decisions in a logical and objective way, is extroverted and sociable, prefers structured environments and keeping the control over situations (e.g., over the scope, trying to freeze it and avoid scope creeping). Differences by project field and years of experience were also accounted for further categorization and research.

Sunindijo (2015) has tested 16 skill components of four skills of effective project managers (conceptual, human, political, and technical skills) to determine their influence on improving project performance in terms of time, cost, and quality. A self-assessed questionnaire was used to assess the skill components of 107 project managers. The questionnaire items were developed based on literature review or adopted from previous studies. The findings show that interpersonal influence has positive impact on project time performance; emotional intelligence, interpersonal skill, apparent sincerity, and budgeting influence project cost performance; and visioning, emotional intelligence, interpersonal skill, transformational leadership, interpersonal influence, apparent sincerity, quality management, and document and contract administration influence project quality performance. Nijhuis *et al.* (2015) developed a taxonomy for project management competences. Two taxonomies appear to be fit to be used in an augmented form for classifying project management competences: the hyperdimensional taxonomy (Tett *et al.*, 2000) and the open systems taxonomy (Shrivastava, 2007). They argued that the hyperdimensional taxonomy shows a better fit for the purpose of their work. The resulting taxonomy can be used to compare and aggregate

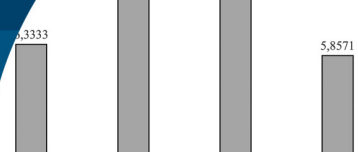
recent research for instance in identifying key educational challenges. The abilities that a project manager needs to develop are: problem awareness, decision making, directing, planning, coordination, monitoring, initiative, cooperation assertiveness, customer focus, trustworthiness, creative thinking, stress management, communication.

A model of construction project managers' competencies in Poland was proposed by Dziekoński (2017). The model included factors related to the project manager's attributes and could serve as a reference in the development of an integrated approach to the management of construction projects. The results showed a relationship between personal skills, knowledge and abilities of construction engineers on managing capability. These results enabled the identification of four factors affecting the construction project managers' competency: basic managerial skills, interpersonal abilities supporting managerial skills, emotional intelligence, and formal skills. Successful project managers need to develop their intellect, creativity, stress-dealing, teamwork, decisiveness, impact-assess, establish contacts, formulate goals, communication, organize work, motivation, assertiveness, self-confidence, integrity, competence, goals-focusing, negotiation, solve conflicts, manage scope, time and cost, confident, empathic, flexibility, capacity. Maqbool *et al.* (2017) examined the relationship and impact of construction project managers' emotional intelligence (EI), managerial competencies, and transformational leadership style on project success. The results show that project managers with high emotional intelligence who bear the desired competencies and exhibit transformational leadership behaviour are effective leaders and ensure higher success in projects than their counterparts, as they not only understand their own emotions but those of others, and manage their own and others' emotions in the appropriate way. Thus, the success of a project is not just all about state-of-the-art equipment or the latest inventions, but it is also about people and their behaviours as well as competencies, which are the main driving forces behind success. Successful project managers need to develop their self-awareness and emotional intelligence.

Gruden and Stare (2018) carried out a quantitative survey to identify the importance and influence of competencies on efficient project performance. The following behavioural competencies were found to be the most

important competencies for effective project performance: assertiveness (influencing the duration and work hours), relaxation (costs), and consultation (work hours). Leadership was also not shown to be the most important competency in the regression analysis of the influence of competencies on efficient project realization. The competencies that a project manager needs to develop are: engagement and motivation, self-control, assertiveness, relaxation, openness, creativity, results orientation, efficiency and consultation. Sang *et al.* (2018) evaluated project manager competency for green construction by means of a literature review and a focus group meeting. A questionnaire survey was implemented for data collection and a total of 262 responses were collected. Leadership and organization (co-operation, engaging communication, teamwork, conflict management), target management (resource management, financial management, risk management), and emotional intelligence (interpersonal skills, emotional control ability, *guanxi* management) of project managers are considered to be important factors that affect green construction performance. Alvarenga *et al.* (2019) defined the project managers' most important competencies to project success in a traditional universe of competencies present in the literature and investigate the correlation among the competencies and the underlying groups of competencies. Their results show that communication, commitment and leadership appeared at the top 3 aspects in terms of relevance. The top 10 attributes include decision making, team work, negotiation, conflict management, customer relationship, interpersonal relationship and time management. Their multivariate analysis identified seven groups of competencies – self-management, interpersonal, communication, technical, productivity, managerial and leadership, and the latter showed the highest eigenvalue and variance. Their study group pointed out theoretical implications, such as the growing focus on soft competencies, but also practical aspects, such as the need of an update on project management education to fill the gap between education and the real world.

The relationship between the three dimensions of leadership competencies was examined by Podgórska and Pichlak (2019), which refer to the competency school by Higgs and Dulewicz (2003) and impact on project success



as well as the moderating influence of project type. First, the obtained results support the importance of the personal characteristics, skills and knowledge of managers for the purpose of project success. The study shows that leaders' actions are crucial in terms of promoting effective cooperation within the project team and are considered as a response to the growing requirements of projects. Second, the analysis shows the relationship between project manager's leadership and project success for different types of projects. The outcomes of these analyses prove that project manager should be flexible and must be able to adopt appropriate leadership style for the purpose of a project type. The most important competencies are: conscientiousness, resource management, motivation, sensitivity, results achievement and communication. Zulkiffli and Latiffi (2019a,b) aimed to identify the project manager's leadership skills in the pre-construction phase of sustainable construction projects. Based on the literature, eight appropriate leadership skills for project managers in pre-construction phase of sustainable construction project are identified as follows: communication skills, motivation skill, decision-making and problem-solving skills, conflict management skill, delegation skill, planning and goal-setting skills, team building skill, negotiation skills. Moradi *et al.* (2020a) aimed at studying possible discrepancies between results of 381 previous studies and four standards of practice on project managers' competencies, and identifying relevant competencies of different project types based on previous studies.

According to the gained results, it can be concluded that there are certain discrepancies between the research-based results and standards of practice. Those discrepancies include commonly existing/missing competencies; uneven priority of some competencies in the view of researchers' versus standards of practice; uneven degree of consensus on the importance of competencies; and research results are more context-oriented than the standards of practice. It looks possible that partial explanation of this is relating to differences in understandings the competency concept itself.

Communication, leadership, teamwork and cooperation, flexibility, problem solving, goal orientation, developing others, impact and influence, stakeholder management, cost management, and resource management were identified

as project managers' key competencies. Development of a synthesized list of project managers' 98 competencies is another main result of this study. Also, it was found that 68 out of those 98 competencies can be classified as weighty competencies with respect of their appearance and likely importance for the success of project (Moradi *et al.*, 2020a).

According to the investigation of Li *et al.* (2020), the results indicate that international project manager competences can be understood from an efficiency-effectiveness-oriented perspective and an input-output-focused perspective. The study used archival data to investigate international project manager competences. The data set consists of the reports that described the project experiences of 26 international project managers nominated by China International Contractors Association (CHINCA). Mixed methods were adopted to analyse the data set. Four competence sets are identified, including fundamental knowledge and skills (expert knowledge, decision-making ability), goals-oriented competences (cost control, schedule management), uncertainty and change management competences (routinization, change and claim management, proactive planning, risk management), and stakeholder management competences (team building and development, third-party management, dedication, communication skills, localization management). Moradi *et al.* (2020b) presented an investigation that aimed to evaluate project managers' competencies in collaborative construction projects in Finland through a human behavioural approach, where project managers' everyday work was the main source for understanding the competencies of relevance. Accordingly, a web-based questionnaire and semi-structured interviews were used for data collection from the case projects. Based on the gained data, project managers' behaviours were analysed, and consequently, their specific competencies were identified. Findings of this study propose 10 core competencies for project managers in collaborative construction projects, e.g., group capabilities, language proficiency, stress tolerance (management), flexibility, relationship building, leadership, maintaining order, achievement orientation, and understanding others. Additionally, a set of 7 supportive competencies (supplementary for core competencies) of project managers were found to be emotional awareness,

communication, innovativeness, developing others, initiative, organizational savvy, and management (Moradi, 2021).

Project manager's skills framework (PMSF) required in improving complex construction projects in Kuwait was presented by Alshammari *et al.* (2020). The potential skills for project managers consist of 23 elements. It was found that skills such as teamwork, effective communication with staff and contractors, and effective resource management, effective planning and training, risk management are some of the important factors.

According to the PMBOK Guide (PMI, 2021), leadership skills are useful for all project team members whether the project team is operating in an environment with a centralized authority or a shared leadership environment. The following sections describe some of the traits and activities associated with leadership and project management: establishing and maintaining vision, critical thinking, motivation, interpersonal skills (emotional intelligence, decision-making, conflict management). Ahmadi Eftekhari *et al.* (2022) assessed the relationship between project manager competencies and project complexity. The study identified 41 competencies within project complexity, with these grouped under the following 10 dimensions: project management (PM) knowledge; management skills; interpersonal skills and attributes; professionalism; expertise; emotional skills; contextual skills; influencing skills; team working; and cognitive skills. According to this research, the top 10 competencies are: leadership; planning skills; results orientation; experience; motivating the project team; problem solving; technical expertise; integration management; change management; and uncertainties management. Blom *et al.* (2023) stated that project manager competence is a crucial factor in the successful management of projects, and a specific set of personal attributes is necessary for project managers to possess. The study identifies personal attributes and leadership styles suitable for different levels of project complexity and lifecycle stages. The research findings support the need for a balanced leadership approach and a positive association between project manager competence and project management success. The most important attributes that they found are: ability to deal with pressure, decisiveness, proactivity, honesty, sense of responsibility,

self-confidence, maturity, foresight, innovation and energy.

## Research phases

Web of Science, Science Direct, Google Scholar, and Research Gate databases were chosen to find relevant previous studies in the subject of project managers' competencies. The following keywords were used for searching: "project managers competencies", "project managers skills" and "successful projects". The search ended up in 29 relevant papers after excluding irrelevant papers based on analysis of abstracts and full texts. The analysis of those resulted in a master list (a matrix of competencies with their references). Next, the competencies in this list were studied further by grouping those having clear equivalence. Analysing those papers led to identifying mentioned competencies of project managers in the previous studies (Table 1). Following, their frequency of appearance provided the basis for their ranking (Table 2). Additionally, a new categorization of project managers' weighty competencies was developed (Table 3). This was developed for structuring weighty competencies and it includes five groups (technical abilities, coping abilities, social abilities, management abilities and values). A comparison was made in terms of the meaning and skill match between the project managers' weighty competencies identified in this study. Project managers' competencies of relevance for different project types or contexts were identified based on the literature study.

## Discussion

Twenty-nine scientific articles have been analysed on the subject of the skills needed for a project manager in order to have successful projects. From all the literature reviewed, the most relevant competencies for project managers have been identified and classified, which have been summarised in detail in the Table 1.

The most relevant competences have been ordered according to the number of repetitions found in the literature. Table 2 shows that Communication competence is the most frequent with 19 repetitions, followed by Leadership with 18 repetitions, Problem solving/Conflict management with 16 repetitions, Result oriented abilities with 15 repetitions and Teamwork with 13 repetitions.



Table 1: (a) Project managers' competencies for successful projects.

N°	Author	Competencies													
		Competence / Technical expertise	Document and contract administration	Critical thinking	Deal with stress	Decisiveness / Decision making	Pro-activeness / Initiative	Sense of responsibility / Commitment	Foresight / Vision	Innovation	Endurance / Perseverance	Order / Organization	Results oriented	Emotional intelligence	Motivation
1	Zimmerer & Yasin (1998)											X	X		
2	Edum-Fotwe & McCaffer (2000)	X	X			X					X			X	
3	Bedingfield & Thal (2008)	X				X		X			X	X	X		
4	Geoghegan & Dulewicz (2008)			X								X	X	X	
5	Nixon <i>et al.</i> (2012)	X					X		X		X	X			
6	Chipulu <i>et al.</i> (2013)	X									X				
7	Creasy & Anantamula (2013)								X						
8	Trivellas & Drimoussis (2013)			X		X		X	X	X	X	X	X	X	
9	Hwang & Ng (2013)	X				X									
10	González <i>et al.</i> (2013)	X				X									
11	Zhang <i>et al.</i> (2013)														
12	Ahsan <i>et al.</i> (2013)	X	X												
13	Montequin <i>et al.</i> (2015)			X				X							
14	Sunindijo (2015)		X					X					X		
15	Nijhuis <i>et al.</i> (2015)					X	X				X	X		X	
16	Dziekoński (2017)	X			X	X			X		X	X		X	
17	Maqbool <i>et al.</i> (2017)												X		
18	Gruden & Stare (2018)								X			X		X	
19	Sang <i>et al.</i> (2018)												X		
20	Alvarenga <i>et al.</i> (2019)	X				X	X	X	X		X	X	X		
21	Podgórska & Pichlak (2019)			X				X			X		X	X	
22	Zulkiffli & Latiffi (2019)					X					X	X		X	
23	Moradi <i>et al.</i> (2020a)											X			
24	Moradi <i>et al.</i> (2020b)				X		X		X		X	X	X		
25	Alshammari <i>et al.</i> (2020)										X				
26	Li <i>et al.</i> (2020)	X				X		X			X	X			
27	PMI (2021)			X		X			X				X	X	
28	Ahmadi Eftekhari <i>et al.</i> (2022)	X									X	X			
29	Blom <i>et al.</i> (2023)				X	X	X	X	X	X			X		

Table 1: (b) Project managers' competencies for successful projects.

N°	Author	Competencies												
		Flexibility	Communication	Interpersonal relationship	Leadership	Teamwork	Team builder	Negotiation	Delegation	Problem solving /Conflict management	Resource management	Change management	Cost management	Risk management
1	Zimmerer & Yasin (1998)	X	X	X	X		X							
2	Edum-Fotwe & McCaffer (2000)		X		X	X		X	X				X	
3	Bedingfield & Thal (2008)									X				
4	Geoghegan & Dulewicz (2008)				X			X		X	X			
5	Nixon <i>et al.</i> (2012)		X		X			X		X				
6	Chipulu <i>et al.</i> (2013)	X	X		X	X				X			X	X
7	Creasy & Anantatmula (2013)		X							X		X		
8	Trivellas & Drimoussis (2013)	X	X	X	X	X		X	X	X		X		
9	Hwang & Ng (2013)				X	X			X	X				
10	González <i>et al.</i> (2013)				X	X								
11	Zhang <i>et al.</i> (2013)			X	X	X				X				
12	Ahsan <i>et al.</i> (2013)		X	X										
13	Montequin <i>et al.</i> (2015)		X											
14	Sunindijo (2015)		X	X	X								X	X
15	Nijhuis <i>et al.</i> (2015)				X	X			X	X				
16	Dziekoński (2017)	X	X	X	X	X		X		X				
17	Maqbool <i>et al.</i> (2017)													
18	Gruden & Stare (2018)	X	X											
19	Sang <i>et al.</i> (2018)		X	X	X	X				X	X		X	X
20	Alvarenga <i>et al.</i> (2019)	X	X	X	X	X		X	X	X				
21	Podgórska & Pichlak (2019)		X		X						X			
22	Zulkiffli & Latiffi (2019)		X				X	X	X	X				
23	Moradi <i>et al.</i> (2020a)	X	X		X	X				X	X		X	
24	Moradi <i>et al.</i> (2020b)	X	X	X	X	X								
25	Alshammari <i>et al.</i> (2020)		X			X					X			X
26	Li <i>et al.</i> (2020)		X				X					X	X	X
27	PMI (2021)									X				
28	Ahmadi Eftekhari <i>et al.</i> (2022)				X		X			X		X		X
29	Blom <i>et al.</i> (2023)													

Table 1: (c) Project managers' competencies for successful projects (continuation).

Nº	Author	Competencies							
		Stakeholder management	Reliability	Ethics	Justice	Loyalty	Empathy	Self-confidence	Self-discipline
1	Zimmerer & Yasin (1998)		X				X		
2	Edum-Fotwe & McCaffer (2000)								
3	Bedingfield & Thal (2008)				X	X	X		X
4	Geoghegan & Dulewicz (2008)						X		
5	Nixon <i>et al.</i> (2012)							X	
6	Chipulu <i>et al.</i> (2013)								
7	Creasy & Anantatmula (2013)								X
8	Trivellas & Drimoussis (2013)		X	X			X	X	X
9	Hwang & Ng (2013)								
10	González <i>et al.</i> (2013)			X					
11	Zhang <i>et al.</i> (2013)								
12	Ahsan <i>et al.</i> (2013)	X							
13	Montequin <i>et al.</i> (2015)				X				
14	Sunindijo (2015)								
15	Nijhuis <i>et al.</i> (2015)								
16	Dziekoński (2017)			X			X		X
17	Maqbool <i>et al.</i> (2017)								
18	Gruden & Stare (2018)		X	X			X		
19	Sang <i>et al.</i> (2018)								
20	Alvarenga <i>et al.</i> (2019)					X			
21	Podgórska & Pichlak (2019)						X		
22	Zulkiffli & Latiffi (2019)								
23	Moradi <i>et al.</i> (2020a)	X							
24	Moradi <i>et al.</i> (2020b)								
25	Alshammari <i>et al.</i> (2020)								
26	Li <i>et al.</i> (2020)	X							
27	PMI (2021)								
28	Ahmadi Eftekhari <i>et al.</i> (2022)								
29	Blom <i>et al.</i> (2023)			X	X	X	X	X	

These skills are followed by Decisiveness/Decision-making, Order/Organisation and Emotional intelligence, all with 12 repetitions.

The competences identified above were grouped according to their affinity into five groups, which are Technical abilities, Coping abilities, Social abilities, Management abilities and Values. The competences were ordered

within the group according to the number of repetitions as analysed in the literature. Table 3 shows the details of the grouping of the competences with their respective number of repetitions.

The Competence/Technical expertise is the most relevant competence among the Technical abilities. The competencies of Result oriented, Decisiveness/Decision-

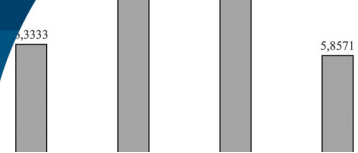
Table 2: Project management competencies ordered by number of repetitions.

Competency	Number of repetitions
Communication	19
Leadership	18
Problem solving /Conflict management	16
Results oriented	15
Teamwork	13
Decisiveness /Decision-making	12
Order / Organization	12
Emotional intelligence	12
Competence / Technical expertise	11
Interpersonal relationship	9
Motivation	9
Flexibility	8
Foresight / Vision	8
Empathy	8
Negotiation	7
Delegation	6
Innovation	6
Sense of responsibility / Commitment	6
Cost management	6
Risk management	5
Endurance / Perseverance	5
Pro-activeness / Initiative	5
Resource management	5
Ethics	5
Critical thinking	5
Change management	4
Team builder	4
Self-discipline	4
Deal with Stress	3
Document and contract administration	3
Stakeholder management	3
Reliability	3
Justice	3
Loyalty	3
Self-confidence	3
Quality management	2

Table 3: Project management competencies ordered by number of repetitions depending on their group of belonging.

Group	Competency	Number of repetitions	
Technical abilities	Competence / Technical expertise	11	
	Critical thinking	5	
	Document and contract administration	3	
Coping abilities	Results oriented	15	
	Decisiveness /Decision-making	12	
	Order / Organization	12	
	Emotional intelligence	12	
	Motivation	9	
	Foresight / Vision	8	
	Flexibility	8	
	Sense of responsibility / Commitment	6	
	Innovation	6	
	Pro-activeness / Initiative	5	
	Endurance / Perseverance	5	
	Deal with stress	3	
	Social abilities	Communication	19
		Leadership	18
Teamwork		13	
Interpersonal relationship		9	
Negotiation		7	
Delegation		6	
Team builder		4	
Management abilities	Problem solving /Conflict management	16	
	Cost management	6	
	Resource management	5	
	Risk management	5	
	Change management	4	
	Stakeholder management	3	
	Quality management	2	
Values	Empathy	8	
	Ethics	5	
	Self-discipline	4	
	Reliability	3	
	Justice	3	
	Loyalty	3	
	Self-confidence	3	





making, Order/Organization and Emotional intelligence are the most relevant competencies among the Coping abilities. Communication, Leadership and Teamwork are the most relevant competencies among the Social abilities. Problem solving/Conflict management is the most relevant competence among the Management abilities. Finally, Empathy and Ethics are the most relevant competencies among the Values.

The five groups of competences are shown in the following bar chart in Figure 1 with the respective weighted average value considering the number of repetitions of the individual competences that are part of each group. It can be observed that the Social abilities' group is the most relevant among the five groups of project managers' competencies, followed by the Coping and the Technical abilities.

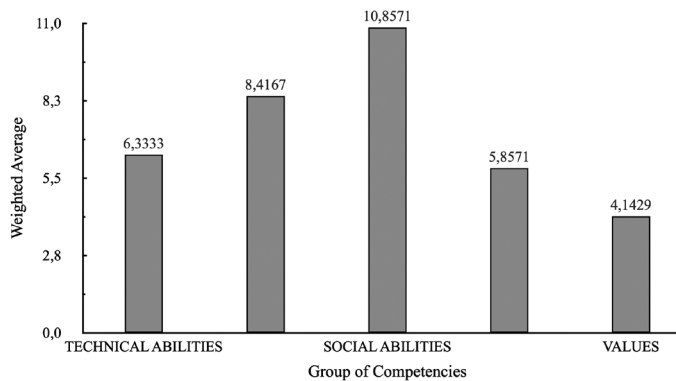


Figure 1: Weighted average importance of project managers' competencies according to their grouping

## Result interpretation

Although a project manager requires to develop most of the competencies that were shown in the tables and diagrams, some abilities are more valued than others. According to the analysis, the Social abilities' group is the most relevant among the five groups of project managers' competencies. The ability of communication is the most frequent with 19 repetitions, followed by Leadership with 18 repetitions, Problem solving/Conflict management with 16 repetitions, Result oriented abilities with 15 repetitions and Teamwork with 13 repetitions. These skills are followed by Decisiveness/Decision-making, Order/Organisation and Emotional intelligence, all with 12 repetitions. Additionally, coping abilities are the second

most relevant competencies. The abilities to deal with different situations and scenarios bring a project manager the abilities to solve them in an optimal manner. It can also be observed that for a project's success, the project manager's technical expertise is not the most important. His or her communicating abilities and leadership are more valued to accomplish the project's goals.

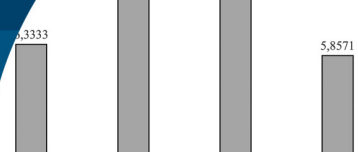
## Conclusion

A project manager should have the capability to make a contribution in a leading role as well as managing, mentoring, and facilitating roles. To enhance his or her competitiveness, this study examined and identified the essential skills required to be a competent project manager of construction projects, and to improve organisations' recruitment of project managers. Communication competence is a necessity for a project manager to be as efficacious as possible. The capability to lead the team, solving problems and managing conflicts, and yet result oriented abilities and teamwork are a must for project managers. To fulfil the projects' objectives, an additional range of skills are needed for a project manager including organization, emotional intelligence, technical expertise and interpersonal relationship. The results confirm a growing trend toward soft skills and reinforce the need for an update on project management education to fill the gap between theory and practice. This study serves as a sound foundation for future studies by providing a starting point and a clear direction to explore. Each skill and even each component could be explored to investigate its impact towards the achievement of project objectives in different project stages. It is also important to identify the most important skill to achieve successful project outcomes at different project stages.

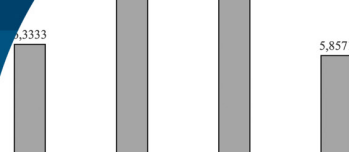
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