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Project Managers Selection in the Construction Industry: Towards the Integration with Artificial Emotional Intelligence and Technology

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ABSTRACT

Emotional intelligence (EI) comes almost automatically to humans when we respond instinctively. This basic level of intelligence tells us how to behave in certain scenarios. However, can this understanding be used with the help of technology in selecting efficient managers in the construction industry where the rate of increase in costs and delays in the construction project never ends and even increases? This conceptual paper proposes a study exploring the theory of artificial emotional intelligence in the construction industry to reduce the increase in cost and time overrun in the project using mixed-method research. The indicators of construction project management success were collected from the literature. The questionnaire was prepared for the second phase, and sample data will be collected from construction project managers nationwide through an online survey to form the new model. Finally, the data will be tested and analysed to see the relationship between construction project managers' EI and project success using artificial intelligence technology. Later, they will be validated with a group of certified project managers in an appropriate workshop. This study will conclude whether selecting an excellent project manager can be achieved with the help of artificial intelligence, characterised by emotional intelligence theory. The study will also verify if there is a significant correlation between the performance of construction project managers with elements in the EI theory by using artificial technology and the success of construction projects.

1. Introduction

It cannot be denied that a country's dependence on the construction sector is very indispensable and closely related to several world indices. The progress of national construction projects, including mega projects, is critical to the country's development. The contribution to the country's gross domestic product (GDP) and socioeconomic progress of the construction sector is substantial through

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capital accumulation, revenue generation and job creation. It has been shown in several studies that there is a strong correlation between the construction sector and the economic growth of a nation worldwide. Like other countries in the world, Malaysia's economic environment, which is not much different from world trends, is expected to record a Compound Annual Growth Rate (CAGR) of 4.7% from 2019 - to 2024 in a shrinking market. Although from a political point of view, the leadership changes, the government's policy remains the same. The government's initiative to stimulate growth by relaxing the terms of public-private partnerships (PPP) is expected to attract more investment in infrastructure development [58].

Construction projects recorded by CIDB Malaysia are categorised into residential, non-residential, social amenities, and infrastructure. In 2020, the value of construction projects awarded was recorded at 7,655 projects worth RM68.7 billion. Overall, in 2020, residential projects had the highest value, representing 35.0 per cent worth RM24.1 billion. The non-residential category ranked second with RM21.1 billion representing 31.0 per cent, followed by infrastructure projects at RM18.8 billion (27 per cent) and social amenities projects at RM4.7 billion (7 per cent) [59]. In 2020, the value of construction work done in Malaysia and worldwide contracted as compared to the previous year. This is due to the Covid19 epidemic that attacked the whole world. However, project management performance cannot be taken lightly and requires appropriate emphasis in line with the amount of money invested. The main issue often debated in Malaysia and worldwide is the project's failure to be completed on time and within the agreed budget.

1.1 Project Failure

A project is categorised as failed when it does not deliver what is contracted within the agreed budget and time. Before a project becomes a failure, it will show symptoms or signs of sickness [2]. However, in most cases, the stakeholders in the project will decide whether the project succeeds or fails based on their judgment and satisfaction with the outcome when the decision is made [3]. Some projects are also considered failures if they fail to meet financial forecasts or achieve ROI targets. However, this study finds cost and time overrun as a yardstick for completing a successful, sick or failed project.

Table 1
Failed Housing Project in Malaysia

Year	Numbers of Project	Numbers of House	Numbers of Buyers
2021 (until Sept)	79	17,724	11,824
2020	78	18,414	11,800
2019	85	20,757	13,137
2018	86	18,105	11,641
2017	254	64,640	43,686
2016	74	10,636	11,339
2015	63	16,419	11,465
2014	68	24,726	17,468
2013	87	32,710	23,572
2012	95	37,252	26,124

Source: Ministry of Housing and Local Government of Malaysia [46]

The World Bank reported that 63% of the 1,778 funded construction projects had poor performance, and the average budget overrun was 40% [1]. A study of 258 projects in 20 countries found that 9 out of 10 projects experienced cost increases, an average of 28% higher than forecast costs [4]. Of the 52 megaprojects surveyed worldwide, only 4 met their spending targets, with the rest incurring an average cost increase of over 88% [5]. In Malaysia, a study by Shehu *et al.* [6] said the delay in public project time was critical, with only 20.5% of projects completed within the allotted time. In the private sector, 33.35% of projects were completed on schedule.

Failures in the construction project significantly impact the construction industry's productivity, leading to higher costs due to work having to be redone. Major project failures are not weeks or months but years too late, and value overspent is measured in multiples of the initially planned sum [7,8]. According to the Malaysian Ministry of Home and Local Government (MHLG), project failures are a project that is not executed consistently for six months within or beyond the Selling and Purchase Agreement (S&P) timeframe and with no substantial operation at the construction sites. When a project is discontinued or fails, there will be an increase in cost and time to complete it. Businesses must deal with bad debts and un-performing financial instruments. In addition, contractors are expected to repay the loan, even though there is no guarantee that the project can be fulfilled on time [9]. The construction industry's reputation will negatively affect potential buyers and local and foreign investors. Stakeholders will face numerous legal consequences, such as financiers, landlords, investors, developers, and consumers. This opens the door to some entities' exploitation and makes reconciliation even more difficult.

Studies reveal that one of the primary reasons for the causal factors connected with the failures of construction projects in Malaysia and many other developing nations is the lack of effective project management. This kind and professional project manager with high leadership abilities, good plans, and a positive way of thinking [8,10]. Hickson [9] stated that human-related factors contribute to construction project failure. It is not tough to realise this since they are highly involved and responsible for planning, directing, managing, and consuming the project and are consistently affected [11].

Many issues relating to project management will take time during the construction phase but will arise much later in the project and result in far higher costs [8,11]. Contract delays can usually be due to inadequate social control and technological knowledge, lack of coordination, and poor understanding of cost control, project accounting, and financial standards, contributing to many contractors' misery [12,13].

The concerns that need to be solved to boost project efficiency have been expressed as persistent and problematic to the building industry [14]. Therefore, the project manager's role in effective communication has become one of the main divisions in project management excellence [15]. Furthermore, leadership style and team integration are appropriate tools used by project managers to reach the success of a project outcome [16]. As for the effects of delay, no question that delayed time and variation order costs are the most critical consequences of uncertainty in the building project. Interpersonal influence ranked first in reducing project failure, followed by management control and technology control [17]. This suggests that these three contingency strategies are beneficial for controlling building project delays.

Table 2
 Previous research on cost overrun.

Author	Project	Cost increase (%)
Cantarely, [53]	78 Projects in the Netherlands	16.2
Heon <i>et al.</i> , [54]	Average Final Cost of Seven Megaprojects	122.4
	The Average Cost For 29 Medium-Sized Projects	32.5
	The Channel Tunnel Scheme in the UK.	80
Flyvbjerg <i>et al.</i> , [4]	Great Belt Connection in Denmark	54
	Humber Bridge in The United Kingdom	75
	Paris Nord TGV IN France	25
Flyvbjerg <i>et al.</i> , [4]	258 Transportation Projects in Twenty Countries.	28
Pickrell's [55]	Eight US Rail Schemes	61
Morrow and McDonnel [56]	52 Megaprojects from Various Regions Worldwide.	88

Understanding project managers' perspectives and lived experiences of leadership, management, decision-making, and self and social awareness are vital to project success or failure. And are the elements in EI theory, it can be established that a lack of EI skills among construction project managers can directly be linked with project failure [8]. To succeed, project managers should have a keen understanding of communication style and a thorough understanding of the leadership management challenges [9,18].

To positively impact group members, project managers today need to have additional characteristics such as empathy, developing others to flourish, and political and cultural understanding [18, 19]. There is an urgent need to address the EI issues in the construction industry. During the 2016 World Economic Forum (WEF) in Davos, it was clearly stated that EI would become the most necessitated skill by employers by the years 2020 and beyond [20].

1.2 What is emotional intelligence (EI)?

Emotional intelligence is a concept that emerged in the 1990s as a topic of scholarly discourse and quickly became popular as an important part of business psychology and the study of workplace dynamics. Emotional intelligence is often referred to as EI (emotional intelligence) as a counterpart to IQ (intelligence degree) [21]. Employees with high EI are more flexible, versatile, enthusiastic and productive. EI is just as important, if not more important, than hard skills and qualifications [22].

Simply put, emotional intelligence refers to the ability to interpret, understand and manage the emotions of yourself and those around you. It's about being calm under pressure, helping others feel comfortable and understanding how your behaviour can affect your environment. While IQ aims to measure cognitive abilities, EI lies in our behaviour [23]. At first, EI seems abstract or haphazard, but our mind is a system, and we must treat it as such. As humans, we know to make now prove the system so that the system works well. This can and should be used for our emotional well-being. An individual may have all the expertise required for a job, but if they cannot communicate with the team and cannot control their emotions, this will negatively affect the quality of their work.

1.3 What Is Artificial Intelligence (AI)?

Artificial intelligence (AI) refers to the simulation or estimation of human intelligence in machines with the help of the latest technology. It is the simulation of human intelligence programmed into machines to think like humans, to acknowledge and mimics their actions. A machine with the support of AI technology can easily mimic it and execute tasks from the simplest to even more complex. This also includes other terms that may be applied to any machine that exhibits traits associated with a human mind, such as learning and problem-solving [24]. The goals of artificial intelligence include computer-enhanced learning, reasoning, and perception as in everyday human behaviour. Human behaviour that uses common sense logic is taught to the machine to act as if it were a human action. AI is being used today across different industries, from finance to healthcare, including the construction industry. The applications for artificial intelligence are endless. The technology can be applied to many different sectors and industries. AI is being tested and used in the healthcare industry for dosing drugs, doling out different treatments tailored to specific patients, and aiding surgical procedures in the operating room [22].

Weak AI tends to be simple and perform single task-oriented and routine tasks. While strong AI performs more complex tasks, multi-tasking, and needs to make quick decisions and think like a human. Some critics of AI technology worry that the widespread use of advanced AI could negatively impact society in terms of lifestyles and job opportunities [25].

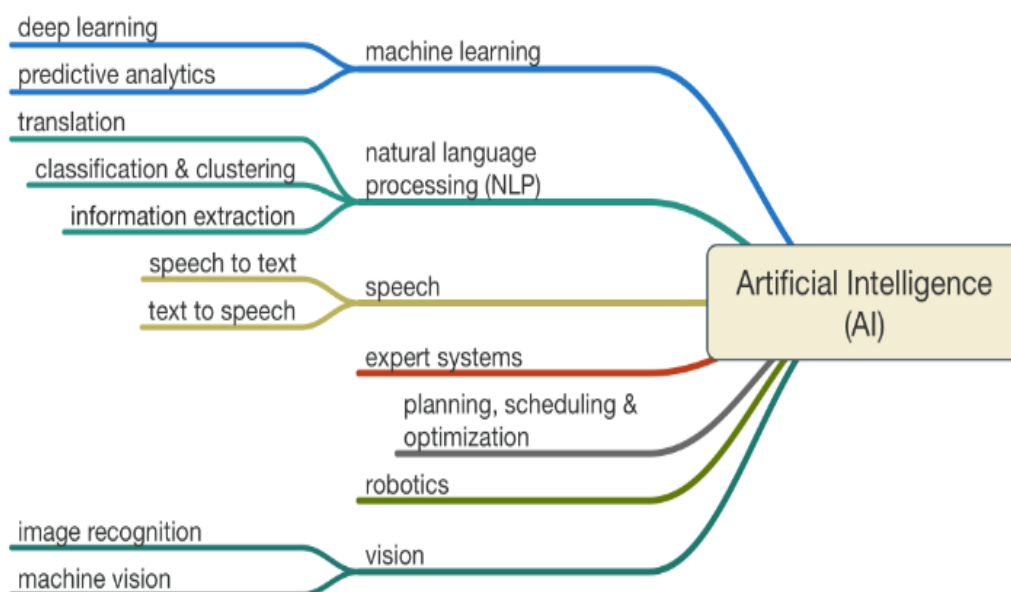


Fig. 1. Artificial Intelligence (AI) diagram, Source: Ganesan Senthilvel [57]

The ideal characteristic of artificial intelligence is its ability to rationalise and take actions that have the best chance of achieving a specific goal. A subset of artificial intelligence is machine learning (ML), which refers to the concept that computer programs can automatically learn from and adapt to new data without being assisted by humans [26]. Deep-learning models have become pervasive tools in science and engineering. Deep-learning accelerators aim to perform deep learning energy-efficiently, usually targeting the inference phase and often exploiting physical substrates beyond conventional electronics. Deep learning techniques enable this automatic learning by absorbing enormous amounts of unstructured data such as text, images, or video [27].

1.4 What is artificial emotional intelligence?

Artificial emotional intelligence can be defined as when a computer can read emotions by analysing data, including facial expressions, gestures, tone of voice, keystroke force and more, to determine a person's emotional state and then react to it [28]. This capability will allow humans and machines to interact more naturally, similar to how human-to-human interactions work. Today, a machine's efficiency in evaluating data helps it pick up subtle human emotional nuances into machine language that responds to real human emotions [25]

The capabilities of computer technology have made it possible for artificial emotional intelligence to work. Through a combination of sophisticated computer vision, high-resolution sensors and cameras combined with real-world data, speech science and deep learning algorithms make this possible. An artificial emotional intelligence system collects data and then processes and compares it with other data points that identify key emotions such as fear and joy. Once the appropriate emotion is identified, the machine interprets it and what it means in each case. As the database of emotions grows, algorithms become better at identifying the nuances of human communication [23].

1.5 How is artificial emotional intelligence used in today's industry?

Emotion recognition software helps advertisers and video marketers gather facial expressions from moment to moment when watching videos with its products for Market Research. They use web cameras, computer vision and artificial intelligence to analyse viewers' facial expressions when watching ad videos. This data is compared to the company's emotional database, and benchmarks for sales lift, brand recall and more to provide ideas for optimising the company's content and media spend. This artificial emotional intelligence has also helped the automotive industry figure out how to use artificial emotional intelligence to transform the transportation experience and reading driving habits, including road safety and passenger experience [29]. These include advanced driver condition monitoring solutions to identify impaired or fatigued drivers and systems for autonomous vehicles.

Microsoft has a team dedicated to developing new technologies that promote emotional resilience and well-being and will use artificial emotional intelligence to sense and respond to emotional states. The HUE (human understanding and empathy) team is challenged by bringing artificial emotional intelligence to Microsoft products, specifically in the search for empathy and human understanding in games and adaptive workspaces [24].

Suppose you've ever been routed through a company's customer service call centre to resolve an issue and found your frustration level rising with each transfer. In that case, you'll appreciate artificial emotional intelligence solutions. It helps identify the caller's mood and adjust how the agent handles the call in real-time. Artificial emotional intelligence technology can be useful in identifying mental health concerns. It can identify signs of mood swings and anxiety when someone is talking on their phone. The MIT Media Lab created a wearable device called BioEssence that senses changes in heart rate to identify pain, stress and frustration and then emits a scent to help the person through that emotional state [30]. This field is growing rapidly and continues to mature, and many industries actively use it to provide better services and products.

1.6 The Application of Artificial Emotional Intelligence in The Recruitment Process

As with many other artificial intelligence applications, developers must be aware that the datasets trained by the technology represent the diversity of our global community to be useful to all. This will hopefully happen with the wider use of this application. Artificial emotional intelligence

is an exciting field and promises a bright future [31,32]. For a long time, humans have been able to claim their dominance over machines in understanding emotions. But that won't be the case forever. While some may doubt that machines will invade emotions, those who work in the field of artificial emotional intelligence, also known as emotional AI or affective computing, say that they are well on their way. All industries worldwide are competing to strengthen the use of artificial emotional intelligence in their fields [32]. This is no exception for the construction sector, where using a large workforce requires a level of mastery that has a very high level of emotional intelligence on the part of project managers.

In selecting an excellent and skilled construction project manager, the method of interviewing candidates is no longer sufficient. In this sophisticated age, anything can happen. Not only the falsification of documents but also the acting and attitude shown will fool the eyes of the interviewers. There are many cases where after succeeding in the interview, the candidate needs to stand out in the given task. This will make it difficult for all parties to replace the wrongly selected candidate. And in the case of the construction industry, this makes the project slow, and the cost increases significantly. The remedial process will be complicated and time-consuming. It is better to have a careful selection at an early stage. So here lies the help of artificial emotional intelligence applications based on the theory of emotional intelligence applied in the selection of a construction project manager.

2. Methodology

It is general information that there are three primary sorts of research, qualitative, quantitative, and a combination of the two ways. This study proposes a qualitative method as the primary methodology, with a quantitative strategy to identify acceptable respondents as workshop participants. Semi-structured interviews with project managers will be conducted using the standard EI questionnaire for the workplace. The data analysis will provide light on the implementation of EI, communication, decision-making, and particular implementation techniques for project managers to consider.

The main emphasis of qualitative research is on selecting the right respondents [33]. Therefore, the first filter through the questionnaire method is more to uncover the project managers who are quite tricky to identify in this study. Then when the respondents have been screened, the actual process of qualitative research is implemented [34]. Therefore, an accurate sampling method is essential so that the results will provide an objective and neutral conclusion later. The rationale for using a qualitative approach in this research was to explore and describe PM's opinion on specific individual criteria. Therefore, the PM's views regarding the EI criteria to complete the project is an advantage of using a qualitative approach in that the study is viewed concerning its context.

EI research is mainly associated with a quantitative methodology epistemologically steered principally by positivistic assumptions [38]. However, literature from previous systematic reviews demonstrates that several researchers have used the combination of two methods combined, qualitative and quantitative approaches, in their cases to accomplish their research objectives [22], [39]. EI and leadership research in the construction industry customarily practices quantitative methodologies, using survey questionnaires to collect data. This is easy to understand because previous studies are more directed toward one trend, determining a manager's EI level in his daily routine. It is different from the method of this study, where the two areas of soft skills and hard skills meet to determine the elements of successful management [40]. In contrast, some of the researcher's qualitative methodologies are based on interviews and case studies [41].

Therefore, this study embraces a mixed-method research approach that offers an in-depth analysis and understanding in detail, which gives a complete picture of the project managers' success factors in managing the construction project in the construction industry. Furthermore, the mixed method research strategy targets each respondent's forte and diminishes any quantitative research studies' weaknesses where the originality of respondents answering the questionnaire is questionable [31,42].

3. Discussion

In this section, the author will explain why a complete study needs to be done on selecting an excellent project manager. From this study, it is expected to conclude whether selecting an excellent project manager can be achieved with the help of artificial intelligence based on the elements in the emotional intelligence theory. The study will also confirm if there is a significant correlation between the performance of construction project managers with elements in EI theory by using artificial technology and the success of construction projects.

3.1 Significance of The Study

Although previous researchers have studied EI and project managers' role in their management style and relationship to project management's success, the study only focused on project management in general. As shown in Table 3, none of the previous researchers studied EI in construction projects relating to the project managers performing their project management roles.

Table 3
Previous research on emotional intelligence

Author	Title
Turner [60]	Determining the Impact of EI in Project Management as a Measure of Performance.
Noraini, Abdullah Sani [62]	The Influence of Efficacy and EI of Technical Secondary School Administrators' and Teachers' Professional Collaboration on Teachers' Job Satisfaction.
Wae, Mathana [63]	Inter-Relationship Between Personality, EI, and Job Satisfaction of Bank Employees.
Shamsudin [64]	The Relationship Between EI, Islamic Work Ethic And Leadership Practices Among Middle-Level Administrators In Malaysian Public Universities.
Vierimaa [61]	EI and Project Leadership.
Huopainen [36]	EI and Multicultural Project Leadership In Finnish-Chinese MNC Context.
Al-Zgool, Mahmoud Radwan [39]	The relationship between leaders' EI, organisational commitment, job satisfaction, and turnover intention in the Jordanian hotel industry.
Kumar M.S.Nair [37]	Relationship Between Leadership Styles, EI, and Organizational Commitment in Small and Medium-sized Enterprises.
Praditsang, Mali [38]	EI, social intelligence, and students' strategic learning behaviour.

Turner [35] has written about EI's impact on project management as a performance measure, while Huopainen [36] researched EI and multicultural leadership. Based on her findings, she highlighted EI and project leadership; however, the main focus is on multicultural leadership. Quantitative research found that Kumar [37] wrote about leadership and EI, using EI as mediating factor toward organisational commitment in small and medium-sized enterprises. Mali's latest study on a similar topic [38] stresses social intelligence and student strategic learning behaviour.

Hence, all the literature reviewed has found that previous studies are more geared towards EI and general project management. There are no previous studies specific to construction project management or project managers. These factors, coupled with new construction concepts such as IBS and BIM, will make this study different from previous studies.

Furthermore, this study emphasises the involvement of Artificial EI, which is very advanced and up-to-date in the recruitment process of a project manager. An immense gap search needs to be done on the linkage of EI and the project managers' performance in successfully managing a construction project. Later from the findings, a new EI model for construction project management may be developed.

3.2 The Impact of EI on The Construction Project Management

The construction industry, one of the most complex project management-based industries, has been the focus of management researchers for many years. Most Western scholars dominate studies on the effects of the work environment on employees [39]. But there still needs to be more awareness about this issue in Malaysia even though there are already enactments that aim to promote a very good working environment. To witness an increase in management competency, the author is persistent in investigating project manager competencies to find the ideal project manager competency profile in this industry compared to the working environment. The reason is that more and more projects in the construction industry have failed due to poor project management [40]. For a long time, it has been understood that technical efficiency is considered the most critical feature essential to the success of a construction project, while social efficiency is not even considered. Therefore, there is research evidence for a change in the construction sector from traditional project management focusing on planning and control to new project management methods emphasising the importance of human relationships and good working relationships [41].

Although many studies show a positive correlation between the emotional intelligence of project managers and project success, only a few explain the interfering mechanisms among them. In his research, Lopes [42] found that transformational leadership is a mediator between EI and leadership effectiveness, teamwork effectiveness, and atmosphere in the workplace environment. Rahim [43] emphasised that the relationships between internal and external stakeholders and the project manager's personality are critical mediators between EI and the success of project management and subsequently reveal the project's success.

Table 4
 Historical project management success trends

Research Focus	Success criteria	Success factors	Emphasis
Period 1 1960s–1980s	“Iron triangle” (time, cost, quality)	Anecdotic lists	Project management success
Period 2 1980s–2000s	“Iron triangle” Client satisfaction. Benefits to organisations End-user satisfaction Benefits to stakeholders. Benefits to project personnel	CSF lists and frameworks	Project/Product success
Period 3 21st Century	“Iron triangle” The strategic objective of client organisations and business success. End-user satisfactions. Benefits to stakeholders Benefits of project personnel and symbolic and rhetorical evaluation of success and failure.	More inclusive CSF framework and symbolic and rhetorical success factors	Project/product, portfolio and program success, and narratives of success and failure

Source: Montenegro *et al.* [52]

EI is an individual ability outlined by psychologist John Mayer [44] at the University of New Hampshire. This point about EI was repeated in his writing in 2004 in the Psychological Inquire Journal [32]. The essence of the writings of famous figures in the science of EI states that EI is an ability and advantage to understand your own and other people's emotions accurately. Be able to immerse yourself in the surrounding situation, understand the signals sent by emotions about relationships, and act in managing your feelings and others by the current situation. EI is a way of approaching, recognising, cognising and choosing ways to think, feel and act. It forms a method of interaction with other people and, meanwhile, understands the situation [45].

EI predicts people’s ability to self-regulate, manage others, and succeed. It is responsible for as much as 80 per cent of the success in our lives [46]. A research study by Salovey and Mayer [44] agreed that EI is a subset of human social intelligence that includes the ability to monitor and control one's feelings and emotions and the emotional state of people around. At the same time, being able to distinguish and identify the emotional state between them and use this information to help in considering a decision, guide one's thinking, to adjust the situation before acting.

Various elements that support EI have been claimed to contribute to the performance and efficiency of a manager's work. EI has been said to predict the manager's job performance because EI is an individual's personality. It affects a person's ability to think, make decisions, and deal with the demands and pressures of the work environment [47]. It has been proven in studies made by previous psychologists that an organisation with a high emotional intelligence staff is also skilled in planning its tasks [44]. On the other hand, it has also been acknowledged in previous writings that managers with a high EI level exhibited excellent success in terms of teamwork performance.

Furthermore, the unity in the organisation in terms of mission performance, the quality of tasks, and the time taken to complete the job is increased [48]. In this regard, project managers with a high level of EI are described as having high communication skills, having high performance at work, functioning in a team, and generally succeeding in producing high-quality work. Thus, it helps managers lead and motivate subordinates in navigating and managing social complexity in the workplace.

On the other hand, the force dealt with thoroughly can control the pressure in and after the job and can avoid extreme depression and anxiety. The ability to control emotions can prevent many mental problems and reduce depression and other chronic diseases. An illustration by Goleman [21] found that emotionally stable people experience less tension than those who are inefficient in self-emotional management. It is apparent that EI also influences relationships so that when a person can perceive and control emotions, it can be easier to communicate and understand how others feel. This skill is crucial because it helps people connect more efficiently and quickly to deeper connections at work and in their personal lives [49].

A person may be highly educated and have the world's best teaching, a sharp, logical mind, and an infinite supply of innovative ideas. However, he still will be a mediocre leader. Some interesting data from past studies found that 90% of the difference between true leaders and administrators is the average EI. In addition, recent studies have also found that managers who cannot control their emotions, such as releasing anger face-to-face, reduce employees' willingness to work beyond their duties and time their work and increase employee turnover [22]. A leader's ability to lead will offer positive feelings to followers that lead to increased success in their work and increase their desire to contribute more than what is allocated.

Mersino [18] found that the most effective teams are with awareness and that each person and the group can improve and strive to obtain a higher level of EI. In addition, Turner [50] says that the EI component is a softer component of accurate intelligence, and it is present in professional work life as well as in a person's personal life. In the traditional understanding, IQ is academically related to learning, reasoning, and compassion. However, the author believes that the height of a manager's IQ only contributes 20% to his management success, while understanding the actual situation and analysing the situation and interaction contribute 80%. In this case, EI is critical to leadership effectiveness.

EI ability has a positive influence and effect on organisational performance. For example, Goleman [21] studied 200 well-known companies and found that 1/3 of productivity is explained by employees' technical skills, while the remaining 2/3 comes from EI skills. In the case of company executive positions, 4/5 of the results are defined by this kind of skill. Goleman [21] also stated that the company's income increases by 2% for every 1% increase in the dynamic environment of an organisation. Another study found that company profit growth was 34% higher in organisations managed by managers with high EI. On the other hand, a leading main cause of executive failure is difficulty managing change, not cooperating well among management and weak interpersonal relationships among senior management [51].

Summary on the information given above, EI, among other benefits, helps people to work better together and improve harmonious interpersonal relationships and mutual understanding. In addition, emotional intelligence has long been associated with leadership in the workplace from both early and recent studies. Factors such as developing others, empathy, and relationship management are related to moral development and are linked to the success of an organisation [43].

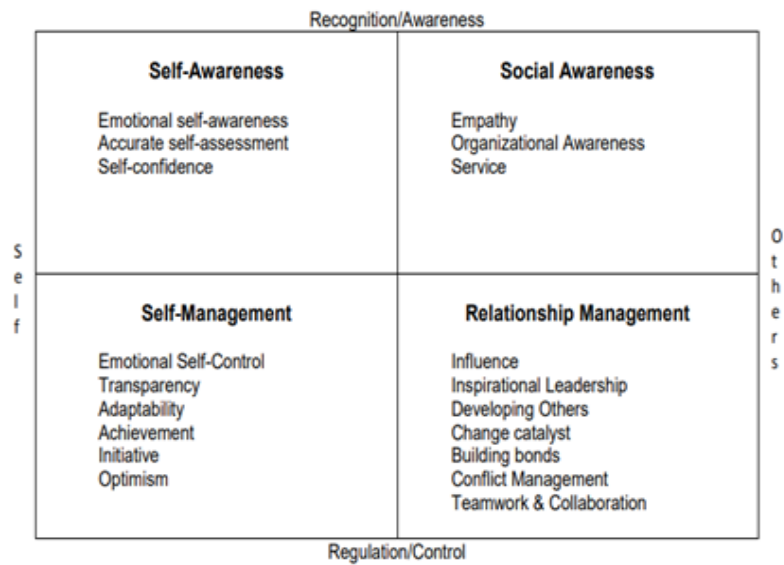


Fig. 2. Daniel Goleman’s Emotional Intelligence Quadrant, Source: Mersino. [18]

3.3 Emotional Intelligence and Construction Project Managers' Performance

This research focuses on project managers' performance and the element of EI theory within project management practice. Findings from the discussion above can be agreed that the skill of emotional competence is closely related to the ability to use experience and intuition in being a reflective project manager that leads construction team members towards building a better overall performance and leading to the success of the project. According to Mersino [18], the project manager is a frontline job. They are the backbone of the construction team, a high-risk role in general and must be proficient in negotiation skills. Must distribute resources equitably and support skills either internally or externally immediately. The ability, capacity, and skills to be emotionally intelligent and accurately assess the situation are very important at this time and are unavoidable in almost all walks of life. They range from effective leadership and building teams to the globe-spanning network of communication, human potential and performance, social skills and economic and political life [52]. The ability to manage feelings and handle stress is an aspect of EI essential to project managers’ success in managing projects.

In certain circumstances, understanding and experiencing what others feel helps a project manager to unintentionally enhance his influence in specific competencies, such as influencing the team and developing trust in the construction team. Similarly, people who can regulate their emotions in all circumstances with others find it simpler to acquire self-efficacy and advance in their employment. Finally, these social-emotional skills are required to find the finest leaders to lead the construction team and to develop a construction project management culture favourable to boosting quantifiable work performance and job satisfaction.

Project success is generally defined in terms of completion time, cost control and quality of work delivered. But instead, the way job satisfaction and individual work performance contribute to and enhance the intended to look at human factors and the benefits gained through a unique perception of success or failure when influenced by an understanding of emotional competencies [53]. Only some people are born with it, but EI can be acquired and improved with practice, unlike IQ. A person with high EI can handle criticism without denial, blame, excuses, or anxiety. Furthermore, they are open-minded and reasonable listeners and do not sugar-coat the truth.

EI has increased interest in fostering leadership development and developing the temporal nature of relating emotions to project management and management practices. However, there is a need to review and study EI awareness with the practicality of project managers' self-management [52]. The researcher believes EI's relevant theory would help apply to construction project management. Understanding a framework for EI will help spread it to the project managers' performance measures and selection criteria in the construction project industry. In their study, Turner and Muller [35] also found that the success of project managers in managing entrusted projects depends more on their efficiency in managing their leadership style, which consists of their internal factors, management focus, and intellectual level. Team members' belief in leadership contributes to the success of combining a manager's transformational style with EI. A manager's leadership style can be measured through in-depth observation or psychometric tests. Still, we can also ask whether the differences can be predicted from easily measured demographic factors.

Effectively, a manager's EI can be measured in how he manages a project by using EI theory to find his ability to monitor the emotions of the project manager himself. And the project team understand the environmental situation and uses the information to guide the understanding and actions of the project manager in managing construction projects [44]. More project managers who realise the importance of leaders and can control and manage the EI elements in themselves will lead to a higher percentage of project success. In general, many studies on the nature of EI have been identified and seen recently in several research papers. However, there is rarely any study on the elements of EI required in a project manager.

3.4 Artificial Emotional Intelligence Technology in The Project Manager Selection Process

However, after discussing at length the strong link between EI and project success, it is necessary to see how to identify a project manager with a strong EI. In a normal interview process, a project manager is usually called to be interviewed based on his experience and knowledge of projects he has managed. Then, the academic background will be checked according to the suitability of the assignment given later. Next, he will be interviewed in front of several panellists appointed by the company. This process has been commonly used in any industry for a long time.

Successful construction project managers who develop EI-related skills will understand and express their own emotions, recognise the feelings of others, detect and control the effects of the work environment, and use appropriate moods and emotions to motivate team members. This self-adaptive behaviour is necessary to ensure success in managing the team and lead to the success of the construction project cannot be revealed while in the interview process. Different work environments and demanding conditions make it highly inappropriate to summarise the EI methods of all managers as the same. The construction team's workplace atmosphere, culture, and background differences should be considered.

However, the interview panel may not attain this attitude of the candidate in a short time. All these virtues may be overlooked in the short interview. After all, human beings can act with all good characters quickly. In this case, using artificial EI will solve this problem with the latest technology and accurately identify a person's attitude and EI [25]. Whether it is the place of origin, experience or academic, as well as the uniqueness of the construction industry itself, only to confirm that the EI measurement mechanism specific to the selection of excellent construction project managers becomes important and needs to be built immediately.

6. Conclusion

EI is crucial since feelings are an intrinsic aspect of work at all stages, from coping with a dissatisfied client to improving workplace culture. Well-validated EI measures can offer insight into this 'always known' but the unassessed area of intra-and-interpersonal functioning until now. In general, and from previous literature studies, it can be concluded that this branch of EI knowledge has long been debated and studied in depth by previous scholars as early as 1920. The field of EI has not reached maturity and is still developing well in line with the development of knowledge related to human emotions. Famous writers in EI, such as Goleman and Boyatzis, are still studying and writing about this theme because the EI field is always dynamic and pragmatic.

However, the applicability of this knowledge to humans and careers is relatively rare. Not to mention the EI study on the duties of project managers who manage construction projects that seem similar but different from the field and project management point of view. This can only be done by choosing a project manager with a high EI in accordance with the responsibilities and roles that need to be played in holding the construction project manager position. Precisely, artificial EI technology assistance is felt to be the time to be developed and integrated comprehensively to identify project managers with high EI and skills in managing projects in addition to human judgement.

In conclusion, based on the findings of this study, a specific study on artificial EI for the recruitment process of construction project managers needs to be done. This will allow an understanding of the role of EI in improving project teamwork with the artificial help of EI, identifying and understanding the emotions of team members and acting according to what is best for the project and the individual as a member of the project team. This study needs to be done immediately.

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