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Emotional Intelligence Competencies Relevant to Construction Workers' Safety Management in the Ghanaian Construction Industry: A Case Study of Abuakwa South Municipality, Ghana

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The study was conducted to investigate the competencies of emotional intelligence most relevant to construction workers' safety management in the Ghanaian construction industry, specifically focusing on the Abuakwa South Municipality. Despite the recognized importance of emotional intelligence in enhancing interpersonal relationships and conflict resolution in project environments, its specific influence on construction workers' safety behaviors has not been extensively studied. To address this gap, the study adopted the quantitative research method. A closed-ended

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questionnaire was distributed to 143 respondents, including architects, quantity surveyors, civil engineers, project managers, contractors, and site supervisors. The data collection yielded a 74% response rate, and responses were analyzed using SPSS to compute Cronbach's alpha and descriptive statistics. The study revealed that construction personnel within the municipality are relatively well-read, this improves their capacity to comprehend and implement emotional intelligence principles in their safety practices on the construction site. Also, the study concluded that the Key components of emotional intelligence such as self-awareness, self-regulation/ management, social awareness/ empathy, social skills/ relationship management, motivation, and job satisfaction are vital for construction workers' effectiveness in their safety management on sites underlining it as an important asset in managing safety in the Ghanaian construction industry. The study recommends further research into the effect of construction workers' emotional intelligence on safety management in the Ghanaian construction industry, also research into the specific emotional intelligence competencies that most significantly affect safety management across different contexts within the construction industry.

Keywords: Emotional intelligence; competencies; safety management; construction; Abuakwa South municipality.

1. INTRODUCTION

The construction industry is known for being risky and accident-prone, with potential hazards from heavy machinery, work at heights, noise, dust, etc. (Dong et al., 2015). Higher death rates for construction workers around the world have been observed, highlighting the industrial crises caused by accidents (Hämäläinen et al., 2006; Fernández-Muñiz et al., 2012). Construction was responsible for 27% of fatalities and 10% of catastrophic injuries in the United Kingdom over the last two decades (HSE 2015). According to Ankrah et al. (2009), Atkinson and Westall (2010), and Cheng et al. (2012), larger projects are safer for personnel.

In developing countries with a substantial building sector, such as Saudi Arabia, workplace accidents and mortality among construction workers continue to be a serious concern (Boyatzis et al., 2000). Studies reveal a substantial link between construction workers' stress and their sensitivity to accidents, as stress can impair focus and safety practices (Lyu et al., 2018; Ayawli et al., 2024).

In Ghana, the construction industry accounts for 4.7% of national occupational injury indices. The construction business has an accident frequency rate of 65, which is 151% more than the national average of 43 (Ghana Statistics Service, 2016). Furthermore, research conducted by Osei-Asibey et al., (2021) on the state of health and safety management on building sites in Wa Municipality discovered that the Ghanaian construction industry lacks health and safety management at all levels of the construction chain.

Research by Leitão and Greiner (2016) revealed that human factors play a major role in construction site safety, with a lack of safety compliance linked to accidents and injuries Emotional intelligence (EI) is emerging as a key concept to understanding construction workers' safety behaviours, attitudes, and risk management. Emotional intelligence involves perceiving, understanding, and regulating emotions in oneself and others (Mayer & Salovey, 1993). Studies show emotional intelligence can help reduce occupational stress, improve well-being, and influence site safety climate (Kukah et al., 2022; Zou & Sunindijo, 2013).

Despite the growth in research on emotional intelligence in construction project management, there is limited research on the specific emotional intelligence (EI) competencies most relevant in the construction context (Kukah et al., 2022; Montenegro et al., 2021). Hence, the rapid growth in the infrastructure development in the Abuakwa South Municipality, calls for a critical investigation into the emotional intelligence competencies relevant to construction workers concerning their safety management on the various construction sites within the municipality.

2. PREVIOUS RESEARCH

2.1 Emotional Intelligence: A Concise History

Edward Thorndike's depiction of 'social intelligence' in 1920 marks the first origins of emotional intelligence (EI). Thorndike (1920) described social intelligence as the capacity to

comprehend and control individuals and behave wisely in human interactions. In 1940, David Wechsler noticed that non-cognitive characteristics including emotive, personal, and social factors play a role in how people employ their cognitive ability for success in life (Wechsler, 1940). In the 1950s, humanistic psychologists like Abraham Maslow began writing about the emotional growth and maturity of individuals (Maslow, 1954). By the 1960s, researchers were actively exploring social intelligence and developing tools to assess one's capacity to understand the emotions, motivations, and behaviours of others (Mayer et al., 2000).

The phrase 'emotional intelligence' initially emerged in a PhD thesis titled "A Study of emotion: Developing Emotional Intelligence" by Wayne Payne in 1985 (Payne, 1986). In the thesis, Payne addressed the significance of controlling emotions to constructively deal with hardship. The first peer-reviewed scholarly study on EI titled "Emotional intelligence" was published in 1990 by psychologists Peter Salovey and John Mayer. They described EI as "the subset of social intelligence that involves the ability to monitor one's own and other's feelings and emotions, to discriminate among them, and to use this information to guide one's thinking and actions" (Salovey & Mayer, 1990).

Emotional intelligence (EI) has gained significant attention in recent decades. Emotional Intelligence (EI) is the capacity to recognize, comprehend, manage, and utilize emotions in oneself and others, as described by Mayer, Salovey, and Caruso in 2004. It includes understanding emotions, controlling emotions, self-motivation, identifying emotions in others, and managing relationships. While the term 'emotional intelligence' is recent, the concept of non-cognitive intelligence components has existed since the 1900s.

2.2 Components of Emotional Intelligence

Emotional intelligence is a multi-dimensional construct that incorporates an array of socio-emotional competencies. There is unanimity amongst academics that EI includes the following fundamental components: self-awareness, self-management, social awareness, and relationship management (Goleman, Boyatzis & McKee, 2013; Mayer et al., 2004).

2.2.1 Self-awareness

Self-awareness refers to the ability to perceive and understand one's feelings, strengths, shortcomings, values, motives, and aspirations (Bradberry & Greaves, 2009; Goleman, 1995). It is the cornerstone skill for developing EI, as knowing oneself is vital before one can control oneself or relate to others. As Goleman (1995) notes, "The ability to monitor feelings from moment to moment is fundamental to psychological insight and self-understanding".

People with high self-awareness have an accurate self-assessment of their emotions, traits, capabilities, and thought processes (Mayer et al., 2004). They exhibit strong introspective abilities and can honestly articulate their strengths, limitations, values, and drivers (Goleman, 1998). Self-awareness enables people to know their emotions and have conviction in their self-worth (Bradberry & Greaves, 2009). It helps them understand how their feelings impact their work performance, relationships, and overall well-being.

2.2.2 Self-management

Self-management refers to the ability to regulate one's emotions and impulses (Ramachandran, 2021; Goleman, Boyatzis & McKee, 2013). It involves effectively managing stress, controlling anger and frustration, thinking before acting, avoiding impulsive behaviours, and persevering through challenges to achieve goals (Stein & Book, 2011).

People with high self-management can harness their emotions for constructive purposes rather than being driven by them (Bradberry & Greaves, 2009). They can delay gratification, balance their drives with self-control, and recover well from emotional distress (Goleman, 1995). Self-management enables productivity and accountability by allowing people to manage their reactions, persist through difficulties, adapt to changing circumstances, and avoid unethical choices (Ramachandran, 2021), and is also a valuable variable to predict academic performance, as it has shown to have significant moderate-high effect size ($r = 0.390$ and $p < 0.001$) (Quílez-Robres et al., 2023).

2.2.3 Social awareness

Social awareness involves the ability to understand other people's emotions,

perspectives, and concerns (Goleman, Boyatzis & McKee, 2013; Stein & Book, 2011). It is the skill of sensing what others feel and think by reading their verbal and nonverbal cues with care and accuracy (Bradberry & Greaves, 2009). Social awareness allows people to tune into unspoken issues, understand different viewpoints, and show sensitivity toward others' needs (Goleman, 1995).

Socially aware people are characterized by their empathy, organizational awareness, and orientation to help others (Goleman, 1998). They can grasp interpersonal dynamics and group feelings well, which helps them relate better (Mayer et al., 2004). Social awareness helps build rapport, understanding, and cooperation with others. It enables positive responses to social dilemmas and conflicts (Boyatzis et al., 1999).

2.2.4 Relationship management

Relationship management involves the ability to develop, influence, inspire, and connect with others while managing conflict (Goleman, Boyatzis & McKee, 2013). It combines interpersonal skills with the effective use of emotions in interactions and groups (Mayer et al., 2004). Relationship management enables collaborative goal achievement through teamwork, leadership abilities, persuasion skills, and expertise in building networks (Goleman, 1995).

People adept at relationship management can communicate, build bonds, facilitate cooperation, and steer through disagreements smoothly (Bradberry & Greaves, 2009). They balance their concern for others with assertiveness about their own needs (Stein & Book, 2011). Relationship management allows groups to collaborate harmoniously and teams to perform optimally for shared objectives (Goleman, 1998). It helps in dealing with the emotions involved in disagreements and negotiations.

In essence, these four core components include the wide breadth of emotional and social competencies that constitute emotional intelligence. Together, they determine how adeptly individuals can manage themselves and their relationships with others (Goleman et al., 2002). Most EI theories include various components of self-awareness, self-management, social awareness, and relationship management in their framework.

2.3 Benefits of Emotional Intelligence for Construction Project Managers

The project-based, fast-paced, and multidisciplinary nature of construction demands a high level of emotional intelligence (EI) amongst project teams (Mo et al., 2006; Love et al., 2004). Emotional intelligence has been connected to many skills considered foundational for effective construction project management, including leadership, communication, negotiation, problem-solving, and relationship management (Edum-Fotwe & McCaffer, 2000).

2.3.1 Leadership

Emotional intelligence is considered very relevant for leadership effectiveness. Managers strong in emotional intelligence (EI) may better encourage teams, handle stress, and role model positive behaviours, leading to improved outcomes (Goleman, 1998). Research by Coronado-Maldonado & Benítez-Márquez, (2023) also indicated that emotionally intelligent leaders improve both behaviors and business results and have an impact on work team performance. They also highlighted a positive relationship between emotional competence and team members' attitudes about work.

In construction, EI has been linked specifically to transformational leadership behaviours like inspiring vision and modelling ethical conduct (Butler & Chinowsky, 2006). Transformational leadership supports innovation, responsiveness to change, and intrinsic motivation – helping project teams adapt to a dynamic project environment (Krog & Govender, 2015).

Meanwhile, low EI impairs the ability to role model ethical conduct or face difficulties forcefully - leading to distrust. Overall, research demonstrates EI predicts significant variation in leadership and team effectiveness (Clarke, 2010).

Thus, EI seemingly correlates positively to a manager's capacity to lead construction teams through difficult, risky projects demanding high collaboration, inventiveness, and resilience.

2.3.2 Relationship building

By efficiently identifying and managing emotional cues, managers strong in EI can allow open communication and develop trust amongst varied construction project stakeholders (Rezvani et al., 2016; Fernández-Berrocal et al., 2012).

Trust increases information sharing, innovative problem solving, and coordination - enabling the collaborative behaviours construction projects rely significantly on. On the other hand, low trust from poor emotional management produces defensive behaviours and prevents cooperation (Colquitt et al., 2007).

Conversely, when project leaders lack emotional awareness or regulation, communication degrades and strains both internal team cohesion and external stakeholder relationships (Mo & Zhang, 2007).

2.3.3 Managing stress

Construction projects inherently involve high uncertainty, risk, and overload. Emotionally intelligent project managers are better able to manage frustration, adapt to changing demands, and recover from stress (Clarke, 2010; Thomas & Mengel, 2008; Rezvani et al., 2018). By role modeling resilience, they support their teams in maintaining positive mindsets and constructive behaviours amidst project challenges.

In contexts with high potential for misunderstandings and conflict like construction, EI seemingly helps prevent project stress from devolving into counterproductive or aggressive responses that harm performance.

3. METHODOLOGY

The quantitative research method was adopted by this research through the use of a closed-ended questionnaire due to its ability to enable quantitative data to be collected in a systematic method so that the data are internally consistent and coherent for analysis (Naoum, 2007). The study was made up of architects, quantity surveyors, site supervisors, civil engineers, project managers, and contractors within permitted construction sites within the Abuakwa South Municipality.

Table for Determining Minimum Returned Sample Size for a Given Population Size for Continuous and Categorical Data by Adam (2020)

Population Size	Sample Size					
	Categorical data (margin of error=.05), p=2			Continuous data (margin of error=.03), p=4		
	90% confidence Level $t = 1.645$	95% confidence Level $t = 1.96$	99% confidence Level $t = 2.58$	90% confidence Level $t = 1.645$	95% confidence Level $t = 1.96$	99% confidence Level $t = 2.58$
10	10	10	10	10	10	10
15	15	15	15	14	15	15
20	19	20	20	19	19	20
25	23	24	25	23	23	24
30	28	28	29	26	27	29
35	31	33	34	30	31	33
40	35	37	38	33	35	37
50	43	45	47	40	43	46
60	50	52	56	46	49	54
70	56	60	64	52	56	61
80	62	67	72	57	62	69
90	68	73	80	61	68	76
100	74	80	87	66	73	83
110	79	86	95	70	78	89
120	84	92	102	74	83	96
130	88	98	109	77	88	102
140	93	103	116	81	92	108
150	97	108	123	84	97	114
160	101	113	129	87	101	119
170	105	118	136	90	104	125
180	109	123	142	92	108	130
190	112	128	148	95	111	135
200	116	132	154	97	115	140
220	122	140	166	102	121	150
250	130	152	182	108	130	163
300	143	169	207	116	142	182
350	153	184	230	123	152	200
400	162	196	250	128	161	215
450	169	208	269	133	168	229
500	176	218	286	137	174	241
600	187	235	316	144	185	262
700	196	249	342	149	194	279
800	203	260	364	153	201	293
900	209	270	383	156	206	306
1000	213	278	400	159	211	317
1200	221	292	429	163	219	334

Fig. 1. Sample size published table

The study adopted accidental sampling techniques to select the respondents. According to Scott & Davis (2007), accidental sampling can also be called availability sampling and is sometimes referred to as convenient sampling. The quantitative research was adopted by this study through the use of closed-ended research was adopted as a result of its convenience in making use of the respondents available at a time for quick response (Scott & Davis, 2007).

A total of 143 closed-ended questionnaires were self-administered to respondents (architects, quantity surveyors, civil engineers, project managers, contractors, and site supervisors) working on construction sites within the Abuakwa South Municipality and 106 were retrieved representing a response rate of 74%. The Statistical Product for Service Solution (SPSS) was applied to process and analyze the data by computing the Cronbach alpha, descriptive statistics of the variables.

Determination of sample size: According to Nkyi (2012) there are various ways to determine the sample size of a study. These include conducting a census for small populations, replicating a sample size from a similar study, using existing tables, and finally applying a formula (e.g., the Kish formula, the Fisher et al. formula, and others). Hence, with a study population of 300 construction workers, the study used 143 sample size as published by Adam (2020).

Research settings: This study was conducted at five (5) large construction project sites within the Abuakwa South Municipality. A sports hotel, Ghana Fire Service Training school, Ghana Health Insurance Office, a 200-bedroom hotel, and an ultra-modern market. These projects were selected due to their sizes in nature, involving well-experienced construction experts who are entrusted to give well-enlightened responses to positively impact the study.

4. RESULTS AND DISCUSSION

4.1 Respondent Rate

Occupationally, the results from Table 1 indicated that civil engineers make up the largest group (29.2%), followed by site supervisors (16%) and project managers (15.1%). This diversity in occupations highlights the varied roles within the construction industry and the potential for emotional intelligence to impact different areas of work conforming to Luz et al. (2015) indication of the wide range of occupations within the construction industry.

Table 1. Respondents' occupation

Occupation	Frequency	Percent (%)
Architect	15	14.2
Quantity surveyor	16	15.1
Civil engineer	31	29.2
Project manager	16	15.1
Contractor	11	10.4
Site supervisor	17	16
TOTAL	**106**	**100**

Source; Field Survey, 2024

4.2 The Key Components of Emotional Intelligence Relevant to Construction Workers

According to the literature, self-awareness, self-regulation, social awareness, and relationship management are essential components of emotional intelligence (Ramachandran, 2021; Goleman, Boyatzis, & McKee, 2013; Stein & Book, 2011; Goleman, 1995). To validate or disprove these findings from the literature in the context of the construction business, respondents were given many statements and asked to indicate their level of agreement or disagreement. The findings are provided in Tables 2, 3, and 4.

Table 2. Descriptive statistics of the EI components

Item	Mean	Std. Deviation	N
1	4.92	0.312	106
2	4.56	0.744	106
3	4.48	0.784	106
4	4.60	0.739	106
5	4.85	0.385	106
6	4.53	0.897	106

(N= number of respondents)
Source; Field Survey, 2024

Table 3. Reliability statistics of EI components

Cronbach's alpha	Cronbach's alpha based on standardized items	No. of items
0.759	0.767	6

The reliability analysis shows a Cronbach's Alpha of 0.759, indicating acceptable internal consistency among the emotional intelligence components

Table 4. EI components relevant to construction workers

No	Key components of emotional intelligence relevant to construction workers	Scale (%)				
		SA	A	N	D	SD
1.	Self-Awareness	92.5	6.6	0.9	-	-
2.	Self-Regulation/ Management	67.0	24.5	6.6	0.9	0.9
3.	Social Awareness/ Empathy	62.3	26.4	9.4	0.9	0.9
4.	Social Skills/ Relationship Management	72.6	17.0	9.4	-	0.9
5.	Motivation	85.8	13.2	0.9	-	-
6.	Job Satisfaction	72.6	13.2	10.4	1.9	1.9

(SA= strongly agree; A= agree; N= neutral; D= disagree; SD= strongly disagree)
Source: Field Survey, 2024

The analysis revealed high mean scores across numerous dimensions, with self-awareness getting the highest mean of 4.92 and almost 93% of respondents strongly agreeing with the statement. This shows that construction workers have a good knowledge of their emotions and how they influence their work (Mayer et al., 2004). Motivation was ranked second highest with a mean score of 4.85, with 85.5% of the respondents strongly agreeing with the statement, reflecting a strong drive among workers, followed by Social Skills/Relationship Management, which scored the third highest mean of 4.60, with 72.6% strongly agreeing to the statement and 0.9% of the respondents strongly disagreeing with the statement, indicating effective interpersonal skills, which are essential for collaboration. This skill enables collaborative goal achievement through teamwork, leadership abilities, persuasion skills, and expertise in building networks (Goleman, 1995). Accordingly, the statement Self-Regulation had a mean score of 4.56 and was ranked 4th with a respondent strongly agreement percentage rate of 67 and a strongly disagreement rate of 0.9%, while 6.6% of the respondents were uncertain with the statement. This indicates that while workers are generally good at managing their emotions, there is room for improvement (Stein & Book, 2011). However, Job Satisfaction attained the 5th position and Social Awareness/Empathy attained the 6th position scoring mean scores of 4.56 and 4.53 respectively. 72.6% of the respondents strongly agreed with the statement that job satisfaction is a key component of emotional relevance to construction workers while 1.9% of the respondents strongly disagreed. This indicates a generally positive work environment enabling positive responses to social dilemmas and conflicts (Boyatzis et al., 1999). With a percentage rate of 62.3, respondents strongly agreed with the statement social awareness component of emotion relevant to construction workers, and 0.9% strongly disagreed while 9.4% of the respondents were unfamiliar with the statement. This result aligns with Goleman (1995) conclusion that social awareness allows people to tune into unspoken issues, understand different viewpoints, and show sensitivity toward others' needs.

5. CONCLUSIONS

This study emphasizes that emotional intelligence is not a supplementary skill, but rather a critical component of efficient safety management among construction workers. The study revealed that construction personnel within the municipality are relatively well-read, this improves their capacity to comprehend and implement emotional intelligence principles in their safety practices on the construction site. Also, the study concluded that the Key components of emotional intelligence such as self-awareness, self-regulation/ management, social awareness/ empathy, social skills/ relationship management, motivation, and job satisfaction are vital for construction workers' effectiveness in their safety management on sites underlining it as an important asset in managing safety in the Ghanaian construction industry. These skills promote improved interpersonal connections and conflict resolution, both of which are essential in high-stress environments such as construction. By understanding and leveraging the power of emotional intelligence, stakeholders may create safer work environments that not only protect workers but also boost productivity and morale.

6. RECOMMENDATIONS

The study recommends further research into the specific emotional intelligence competencies that most significantly affect safety management across different contexts within the construction industry. Future studies could explore the longitudinal effects of EI training on safety outcomes or investigate how cultural factors

influence emotional intelligence in diverse construction environments. Also, further research could be conducted on the effects of construction workers' emotional intelligence on safety management in the Ghanaian construction industry.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc have been used during writing or editing of this manuscript. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology.

Details of the AI usage are given below:

1. Quillbot for paraphrasing

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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