

Critical Thinking Competency and Project Manager Motivation in Sustainable Project Management: A Quantitative Study

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Abstract : *Sustainability has become a core priority for modern corporations, making sustainable project management a major global trend. As companies shift toward these new organizational requirements, the practical burden of implementation falls directly on project managers. When executing corporate projects, the internal motivation of these professionals remains essential for success. However, it is still unclear which specific competencies systematically contribute to the motivation for sustainable project management. This quantitative study examines one central cognitive capability: critical thinking competency. Specifically, the study addresses the research question: What is the linear correlation between critical thinking competency and project manager motivation for sustainable project management?. To test this relationship, a quantitative online survey was conducted with 71 participants. Descriptive analysis examined the continuous variables by assessing mean and standard deviation scores, verifying normal distribution, and measuring reliability via Cronbach's alpha. Subsequently, a parametric Pearson correlation was employed as the significance test. The empirical findings reveal a statistically significant, moderate positive linear correlation between the two variables ($r(69) = .32, p = .007$). Consequently, the data supports the alternative hypothesis. These results indicate that higher levels of critical thinking competency are systematically associated with an increased motivation for sustainable project management. Consequently, organizations can boost project manager motivation by actively developing critical thinking competency within their teams.*

Keywords: critical thinking competency, project manager motivation, sustainable project management, sustainability competences, project management, sustainability, motivation.

I. INTRODUCTION

In recent years, contributing to sustainability has become a primary objective for global institutions [1]. More and more attention is being paid to sustainability. Companies are being encouraged to extend their responsibility not only in financial terms, but also in terms of sustainability performance for all stakeholders [2]. Organizations are thus integrating sustainability strategies into their own corporate vision, mission and strategy [3]. Since projects function as temporary entities designed to implement organizational changes [4], projects and their management are seen as the path to sustainability [5]. Therefore, the concept of green or sustainable project management is widely recognized as a key global trend in project management today [6]. Sustainable project management is essentially about behavior [7], and, as project manager, plays a central role in the sustainability of a project [8]. Several studies have been conducted on the sustainable behavior of project managers [9] and the factors that promote this behavior [10]. Based on these studies, it was found that the internal drive of project managers, which is influenced by their perception of sustainability, is the most important factor in the decision to consider sustainability in the project [9], [10]. However, it will not be possible to implement sustainability in project management with motivation alone; sustainability competencies are required to support precisely this motivation [10].

Competency-based learning programs that focus on cultivating sustainability competencies through knowledge and attitudes have the power to encourage responsible behavior and ignite a desire to initiate or call for change on a local, national, and global scale [1]. By equipping learners with the necessary skills in sustainability, they can effectively resolve the internal conflict that arises when they are aware of an issue but feel powerless to make a difference [1].

"A sustainability competence empowers learners to embody sustainability values, and embrace complex systems, in order to take or request action that restores and maintains ecosystem health and enhances justice, generating visions for sustainable futures" [1].

One of these competencies is critical thinking. According to the European Commission [1], it involves assessing data, identifying presuppositions, and questioning the current state of affairs. Additionally, it requires considering how

individual, societal, and cultural experiences impact decisions [1]. In this study, the relationship between critical thinking competency and project manager motivation for sustainable project management was investigated. The primary objective was to determine whether critical thinking competency underpins the motivation for sustainable project management in project execution. The research question was formulated as follows: What is the linear correlation between critical thinking competency and project manager motivation for sustainable project management?

Hypothesis (H₁):

There is a statistically significant linear correlation between critical thinking competency and project manager motivation for sustainable project management.

Null-Hypothesis (H₀):

There is no statistically significant linear correlation between critical thinking competency and project manager motivation for sustainable project management.

Sustainability is one of the most important key areas in business today [2]. The competencies required for sustainability have hardly been researched according to the current state of the literature [1]. "Personal values are learned beliefs about preferred ways of acting or being" [11]. Competencies "can therefore be trained and developed" [12]. The study fills the gap in the current literature regarding the competencies that support the motivation for sustainable project management of project managers, focusing on the critical thinking competency. The study addresses companies of all sizes that are on the way to establish sustainable project management in any level. The remainder of the document is split into five main sections. Section 2, establishes the underlying conceptual and theoretical framework of sustainable project management and competency development. Section 3 details the empirical research methodology and data collection approach employed in this investigation. Section 4 presents the findings and statistical results of the correlation analysis. Finally, Section 5 provides the findings, theoretical and practical implications, and summarizes the key conclusions of the study.

II. LITERATURE REVIEW

2.1. Definition of Sustainability and Sustainability Competencies

In this study, the concept of sustainability is conceptualized beyond its traditionally broad scope and defined as follows: "Sustainability means prioritizing the needs of all life forms and of the planet by ensuring that human activity does not exceed planetary boundaries" [1]. Magano et al. [13] confirmed the findings of Marnewick et al. [14] demonstrating that it functions as a personal trait driven by an individual's core values.

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2.2. Sustainable Project Management

Sustainable Project Management is defined as "... the planning, monitoring and controlling of project delivery and support processes, with consideration of the environmental, economical [sic] and social aspects of the life-cycle of the project's resources, processes, deliverables and effects, aimed at realizing benefits for stakeholders, and performed in a transparent, fair and ethical way, that includes proactive stakeholder participation" [12].

For sustainable project management to be successful, project managers must possess a deep-rooted sense of motivation [12]. The drive towards sustainability is deeply rooted in the values and beliefs of each individual. It is therefore crucial for organizations looking to adopt sustainable project management practices to focus on shaping and nurturing their project managers' mindset towards sustainability [12]. Various authors argue that adopting a sustainability perspective entails a change in project management emphasis, moving away from solely overseeing time, budget, and quality towards overseeing the social, environmental, and economic ramifications of both the project's substance and execution [15], [16]. In order to effectively incorporate sustainability into project management, Silvius and Schipper [12] argue that project managers need to adapt their cognitive approach. The cognitive shift involves the project manager taking ownership of the project's outcomes while under their supervision [16].

2.3. Competence Framework

2.3.1. GreenComp – The European sustainability framework

The European sustainability competence framework has four competence areas and 12 competences as shown in Table 1. Each competence area has three associated competences [1]. “A sustainability competence empowers learners to embody sustainability values, and embrace complex systems, in order to take or request action that restores and maintains ecosystem health and enhances justice, generating visions for sustainable futures” [1]. This definition places emphasis on equipping learners with sustainability knowledge, skills, and attitudes, enabling them to think, plan, and act in a sustainable manner, in order to harmoniously coexist with the planet. According to the European Commission [1], formal, non-formal, and informal education serve as vital pathways for cultivating this competence. This developmental process spans from early childhood through adolescence, ultimately nurturing sustainable behaviors into adulthood. Consequently, sustainability as a competence remains foundational across all individual and collective aspects of life.

Table 1. GreenComp Competence Framework

Competence area	Competence
Embodying sustainability values	Valuing sustainability Supporting fairness Promoting nature
Embracing complexity in sustainability	Systems thinking Critical thinking* Problem framing
Envisioning a sustainable future	Futures literacy Adaptability Exploratory thinking
Acting for sustainability	Political agency Collective action Individual initiative

Note. * Indicates the core cognitive competency investigated in this study.

2.3.2. Critical Thinking Competency

The competence of critical thinking belongs in the GreenComp framework to the competence area of Embracing complexity in sustainability. Within this framework, the primary objective is to equip professionals with structured, analytical thinking skills [1]. This approach encourages individuals to improve their data evaluation methods and question the sustainability of current practices. Furthermore, as outlined by the European Commission [1], it involves examining systems by pinpointing specific relationships and presenting underlying difficulties as distinct sustainability issues. Such an analysis aids in understanding the true magnitude of a problem while simultaneously recognizing all relevant stakeholders [1]. Critical thinking is seen as essential for individuals to deal with unpredictability, intricacy, and transformation [17]. So critical thinking is an advanced mental activity that involves various abilities required to assess and comprehend information related to sustainability issues. This allows individuals to expand their perspectives without blindly accepting information and its sources [1]. Ultimately, individuals should feel confident when obtaining and combining information from diverse fields of study [18]. A critical perspective enables individuals to question, and modify, their beliefs, viewpoints, and perception of the world [19].

2.3.3. Self-Determination Theory



Figure 1. Theoretical foundation of SDT

Self-determination theory (SDT) is a widely used framework for understanding human motivation and how specific environmental factors influence employee engagement. Structurally, SDT focuses on social and contextual elements, including how leadership styles affect autonomous motivation in the workplace [20]. The theory proposes that three basic psychological needs, autonomy, competence, and relatedness (see Fig. 1) are essential for sustaining optimal performance and psychological well-being. When organizations successfully satisfy these core needs, employees show higher levels of autonomous motivation and commitment to their professional responsibilities [21]. Therefore, the fulfillment of these basic psychological needs directly influences the quality of motivation an individual develops toward workplace activities. When managers support independence and professional connection, staff members are more likely to become self-motivated [22]. Employees who are self-motivated tend to perform their tasks with higher engagement and a clear understanding of the value and significance of their role. They take ownership of their responsibilities and carry them out autonomously [20]. To develop the empirical questionnaire, this study directly draws on the principles of SDT and the GreenComp framework to ensure a strong theoretical foundation for the survey items.

2.4. Conceptual Framework

The conceptual framework shown in Fig. 2 focuses on the relationship between two main variables: critical thinking competency and project manager motivation for sustainable project management. Specifically, the study tests the hypothesis (H_1) that there is a positive linear correlation between these two variables.

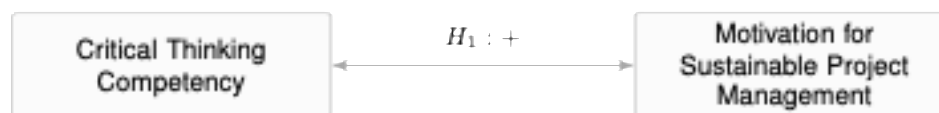


Figure 2. Conceptual framework

III. RESEARCH METHODOLOGY

To address the research objectives, a quantitative research design utilizing a standardized online survey was deployed. The main focus centered on exploring the relationship between critical thinking competency and project manager motivation for sustainable project management. Since there is no predetermined list of project managers, a non-probability and snowball sampling technique was utilized. To ensure participant anonymity and reduce drop-out rates, detailed demographic characteristics were not collected. Instead, the survey link was distributed exclusively through the author's personal and professional networks. Qualified respondents were subsequently encouraged to share the link within their own professional circles to reach additional project managers. The survey itself was designed as an online self-administered questionnaire. A study titled "Exploring the values of a Sustainable Project Manager" was carried out in a similar manner by Sluijs and Silvius [23]. The digital questionnaire consisted of inquiries regarding the motivation behind adopting sustainable project management practices and the proficiency in critical thinking. An ordinal Likert scale was utilized for assessment.

To determine the required sample size a priori, a power analysis was conducted using G*Power, indicating a target of 84 participants ($p = .30$, Power = .80, two-tailed). The online survey was active between March and April 2026, yielding 71 respondents, all of whom were considered valid. Although the initial target of 84 participants was not achieved within the two-month timeframe, the collected data provided a robust foundation for the statistical investigation. For the purpose of this investigation, SPSS software was utilized to analyze the data. The dataset was transferred directly from the online survey platform SoSci Survey to SPSS. The key parameters under investigation were the continuous variables of critical thinking competency and project manager motivation for sustainable project management. Continuous data was examined using descriptive analysis, with mean and standard deviation values reported for central tendency and dispersion. The normal distribution of variables was assessed. Reliability was measured using Cronbach's Alpha. Subsequently, significance tests were conducted with a significance level of 5% for all statistical analyses. Pearson correlation was employed as the significance test method. All analyses were performed using SPSS software version 32.0.0.0 (139).

IV. DATA ANALYSIS AND RESULTS

4.1. Scale Reliability and Assumption Testing

To evaluate the internal consistency of the measurement instruments, Cronbach's alpha (α) coefficients were calculated for both scales. As shown in Table 2, both instruments proved highly reliable. They easily cleared the standard threshold of .70. Before running the primary correlation analysis, the data distribution was checked. This was done using visual inspections of Q-Q plots. The data followed a normal distribution. Therefore, all statistical requirements for a parametric Pearson correlation were fully met.

Table 2. Reliability and Descriptive Statistics of Scales

Variable	Number of Items	<i>M</i>	<i>SD</i>	Cronbach's α
1. Critical Thinking Competency	3	6.35	0.49	.86
2. Motivation for Sustainable Project Management	4	6.02	0.66	.82

Note. *M* = Mean; *SD* = Standard Deviation. Cronbach's α values above .80 indicate good internal consistency.

4.2. Pearson Correlation Analysis

The Pearson correlation analysis confirms a significant, moderate positive significant relationship between the two main variables ($r(69) = .32, p = .007$).

Table 3. Pearson Correlation Matrix with Descriptive Statistics

Variable	<i>M</i>	<i>SD</i>	1	2
1. Critical Thinking Competency	6.35	0.49	—	
2. Motivation for Sustainable Project Management	6.02	0.66	.32**	—

Note. *N* = 71. *M* = Mean; *SD* = Standard Deviation.

* Correlation is significant at the .01 level (2-tailed).

4.3. Hypothesis Summary

The empirical results confirm a significant positive linear correlation between the variables ($r = .32, p = .007$). Higher scores in critical thinking competency are systematically linked to increased project manager motivation for sustainable project management. Based on these findings, the null hypothesis is rejected. This hypothesis had assumed that no relationship exists between the two variables. The data clearly supports the alternative hypothesis (H_1).

V. CONCLUSIONS

5.1. Findings and Discussion

The main objective of this research was to explore the connection between critical thinking competency and project manager motivation for sustainable project management, and to provide recommendations for companies seeking to enhance sustainability integration. The research question was: What is the linear correlation between critical thinking competency and project manager motivation for sustainable project management?

To build the theoretical foundation, this study utilized the GreenComp competency framework. A quantitative study was conducted to test the correlation between critical thinking competency and project manager motivation for sustainable project management within the sample. The empirical findings reveal a statistically significant, moderate positive linear correlation ($r(69) = .32, p = .007$). Based on these statistical results, the null hypothesis (H_0) is rejected. This hypothesis had assumed that no relationship exists between the two variables. The data provides strong support for the alternative hypothesis (H_1). This outcome indicates that higher critical thinking competency is systematically associated with a stronger drive among project managers to implement sustainable practices during corporate project execution.

5.2. Contribution to Science and Practice

This study provides practical insights for organizations and project professionals. Today, companies often struggle to build solid, sustainable project workflows. The gathered data helps address this issue. By offering a clear theoretical foundation, the study illustrates the explicit interplay between critical thinking competency and project manager motivation for sustainable project management. This adds a new perspective to the current literature. It provides hard empirical evidence that critical thinking competency directly influences this specific motivation. Right now, the academic literature lacks clear links between these concepts. This study helps close that gap. The practical takeaway is straightforward. Organizations need to actively train critical thinking competency. This analytical competency serves as a key tool to systematically boost project manager motivation for sustainable project management on the job.

5.3. Limitations and Future Research

Several methodological limitations influenced the outcomes of this study. First, the sample size is limited to 71 participants. While statistically sufficient for a correlation analysis, a larger sample would increase global generalizability. Additionally, the data collection period lasted only eight weeks. Future research should collect data over a longer timeframe to capture potential shifts in professional attitudes.

Second, a non-probability snowball sampling technique was used. This approach relied heavily on personal networks. Consequently, it introduces a potential selection bias. Project managers who already possess a strong interest in sustainability might have been more likely to join the study. Future studies should target a more diverse, randomly selected sample to minimize this effect. Geographically, the sample focused strictly on European professionals. Examining these variables in different cultural regions, such as Asia or the USA, is an important path for future investigations.

Beyond these aspects, this study proves that critical thinking competency directly influences project manager motivation for sustainable project management. However, how exactly such corporate training programs should be designed remains unanswered. Future intervention studies should test different types of critical thinking training and evaluate their direct impact on project manager motivation. Additionally, researchers should examine the other competences listed in the GreenComp framework to map out their specific significance for sustainable project execution.

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