# PRIORITIZATION OF SUSTAINABLE DEVELOPMENT GOALS: A CASE STUDY APPLICATION FOR AGILE PROJECTS

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## Highlights

- Evaluation of Sustainable Development Goals in the context of agile projects
- A connection between agile project development and sustainability
- Agile project development study in a developing country

**ABSTRACT**

In today's fast-changing industrial landscape, project management serves as a cornerstone for driving digital transformation across diverse sectors. Regardless of whether an organization is a small enterprise, a medium-sized business, or a multinational corporation, effective project management is essential for ensuring the successful and efficient delivery of objectives. Traditional approaches like the waterfall model, which rely on linear processes, often prove inadequate in environments requiring rapid iteration and shorter delivery timelines. Conversely, agile methodologies have gained prominence due to their flexibility and capacity to adapt, providing a sustainable framework for addressing the complexities of modern projects. However, the intersection of agile practices and sustainability remains underexplored, with much of the existing research focused on developed countries. Limited attention has been given to how agile methodologies can align with the United Nations' Sustainable Development Goals (SDGs), leaving a critical gap in understanding their potential synergy. Furthermore, few studies have utilized Multi-Criteria Decision-Making (MCDM) methods to evaluate the role of SDGs in improving agile project outcomes. This study aims to address these gaps by applying the Analytic Hierarchy Process (AHP) to evaluate and prioritize SDGs relevant to a case organization. The identified goals are weighted based on the company's sustainability strategy, providing a structured framework to guide future agile project improvements. This study offers a unique perspective on how sustainability considerations can be integrated into agile project management. This research contributes to the literature by proposing a novel approach that connects sustainability objectives with agile methodologies, paving the way for organizations to enhance project outcomes while supporting long-term SDGs.
**Keywords:** sustainable development goals, agility, AHP

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## 1. Introduction

In today's rapidly evolving industrial environment, project management has emerged as a fundamental practice for successfully implementing digital initiatives across various sectors (Aguda et al. 2021). Regardless of the size of an organization—be it a small business, a medium-sized company, or a global enterprise—effective project management remains indispensable for achieving project goals efficiently. Traditional frameworks, such as the waterfall methodology, may not be a sustainable option in scenarios where quicker delivery cycles and iterative development processes are prioritized (Leong et al. 2023). In contrast, agile methodologies, known for their flexibility and adaptability, have emerged as a dominant approach, offering a sustainable solution to meet the demands of modern project environments.

The existing body of literature reveals a significant gap in exploring the connection between agile project development and sustainability, with research predominantly focusing on developed nations. Additionally, there is an absence of MCDM-based studies that assess the SDGs in the context of enhancing agile projects. This study applies the AHP method to assign weights to the SDGs identified by a case company, in alignment with its pre-established sustainability objectives, to support future agile project development initiatives.

## 2. Literature Review

The Agile software methodology encompasses a set of software engineering practices that emphasize iterative and incremental development, aligning with the core principles outlined in the "Agile Manifesto" (Fowler and Highsmith 2001). The Agile Manifesto outlines a set of guiding values and principles that prioritize flexibility and adaptability in the development process. It advocates for continuous collaboration, delivering customer value, and promoting adaptive planning, in contrast to traditional, rigid frameworks that focus on extensive upfront planning and heavy documentation (Fowler and Highsmith 2001). This shift towards a more dynamic and responsive approach marks a significant departure from conventional methodologies, enabling teams to better address evolving project requirements and customer needs. As agile methodologies gain widespread adoption, even among large-scale organizations in the software industry, a notable shift is occurring towards ensuring that software projects are delivered on time and within budget. The current literature highlights a notable gap in examining the relationship between agile project development and sustainability, with most research concentrated on developed countries. Moreover, there are limited studies that evaluate the Sustainable Development Goals in conjunction with MCDM methods. For example, Cao and Solangi (2023) assessed the challenges and solutions of sustainable agriculture in China to advance the Sustainable Development Goals, employing AHP and SAW methods. Dai and Chen (2023) assessed green financing mechanisms for natural resource management aimed at achieving the Sustainable Development Goals, employing Fuzzy AHP and Fuzzy VIKOR methods. In the literature, there is a need for studies that utilize MCDM methods to evaluate the SDGs in the context of improving agile projects.

## 3. Research Design/Methodology

### AHP method

The AHP is built upon three fundamental principles (Saaty 1980). These include the establishment of a hierarchical structure, the analysis of priorities, and the verification of

consistency. First, AHP requires the creation of a clear hierarchy to represent the decision problem, where each level of the hierarchy breaks down the complex issue into simpler, more manageable components. Second, the method focuses on prioritizing these elements based on their relative importance. Finally, AHP ensures the reliability of the decision-making process by checking the consistency of the comparisons made between criteria and alternatives. The steps applied in AHP are as follows:
Step 1. Identify the decision problem.
Step 2. Create a hierarchical structure to represent the problem.
Step 3. Build a matrix for pairwise comparisons using the Table 1.

Table 1 Pairwise Comparison Scale (Saaty 1980)

| **Fundamental Scale (Row v Column)** | |
|---|---|
| Extremely less important | 1/9 |
| Very strongly less important | 1/7 |
| Strongly less important | 1/5 |
| Moderately less important | 1/3 |
| **Equal importance** | 1 |
| Moderately more important | 3 |
| Strongly more important | 5 |
| Very strongly more important | 7 |
| Extremely more important | 9 |
| Intermediate values between two adjacent judgements | 1/8, 1/6, 1/4, 2, 4, 6, 8 |

Step 4. Make judgments regarding the pairwise comparisons.
Step 5. Combine the results of the pairwise comparisons
Step 6: Verify the consistency of the judgments using the Consistency Index (CI) and Consistency Ratio (CR), as shown in Equations 1 and 2, respectively.

$$CI = (\lambda_{max} - n) / (n-1) \quad (1)$$

$$CR = CI / CR \quad (2)$$

If the CR exceeds 0.1, the judgment matrix is considered inconsistent.

## 4. Results/Model Analysis

Our case study was conducted within X-System, a company dedicated to advancing a more sustainable world by leveraging technological innovations and digital solutions aligned with the United Nations' SDGs. Focusing on both economic growth and societal benefits, X-System continues to create long-term value for businesses and society through its digital transformation journey. X-System places particular emphasis on ensuring quality education (SDG 4), promoting decent work and economic growth (SDG 8), fostering industry, innovation, and infrastructure (SDG 9), building sustainable cities and communities (SDG 11), ensuring responsible consumption and production (SDG 12), and taking urgent climate action (SDG 13). The prioritization and weighting of these goals will influence the company's future initiatives aimed at improving agile project. The pairwise comparison matrix, aggregated based on the evaluations of three experts from the company, is presented in Table 2.

Table 2. Pairwise comparison matrix

| | SDG 9 | SDG 13 | SDG 4 | SDG 12 | SDG 8 | SDG 11 |
|---|---|---|---|---|---|---|
| SDG 9 | 1 | 4 | 8 | 3 | 2 | 7 |
| SDG 13 | 1/4 | 1 | 2 | 1/2 | 1/3 | 1 |
| SDG 4 | 1/8 | 1/2 | 1 | 1/4 | 1/5 | 1/2 |
| SDG 12 | 1/3 | 2 | 4 | 1 | 1/2 | 2 |
| SDG 8 | 1/2 | 3 | 5 | 2 | 1 | 3 |
| SDG 11 | 1/7 | 1 | 2 | 1/2 | 1/3 | 1 |

Since the CR is approximately 0.01, the evaluations have been considered consistent. In Table 3, the weights assigned to the determined SDGs are determined.

Table 3. Weights of the determined SDGs

| | Weights |
|---|---|
| SDG 9 | 0.415 |
| SDG 13 | 0.083 |
| SDG 4 | 0.043 |
| SDG 12 | 0.148 |
| SDG 8 | 0.235 |
| SDG 11 | 0.075 |

## 5. Conclusions

The assigned weights for the SDGs are as follows: SDG 9 (0.415), SDG 13 (0.083), SDG 4 (0.043), SDG 12 (0.148), SDG 8 (0.235), and SDG 11 (0.075). By integrating the weights of these SDGs with the company's future agile practices, it will be possible to develop strategies that guide the company towards becoming more sustainable. This alignment allows for a more structured approach to sustainability, ensuring that agile methodologies are employed in ways that contribute to the achievement of the company's long-term sustainability objectives.

## 6. Limitations

The study presents several limitations that should be considered when interpreting the results. One key limitation is the relatively small number of participants involved in the research. The findings could be further generalized if a larger sample size, including a broader range of experts from various companies, were included. This would help capture a wider diversity of perspectives and experiences, thereby enhancing the robustness of the conclusions. Moreover, the study was conducted solely in Turkey, which may limit the applicability of the results to other contexts. Expanding the research to include experts from other developing countries would provide a more global perspective, offering valuable insights into how agile practices and sustainability objectives align in different regional and economic settings. A cross-country study could also help identify region-specific challenges and opportunities, improving the external validity of the findings and making the results more relevant to a wider audience.

## 7. Key References

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