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# Business intelligence for sustainable project performance: The role of data-driven project management capabilities

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**A B S T R A C T**

This study aims to examine Business Intelligence (BI) and its influence on Sustainable Project Performance (SPP) from the perspective of Data-Driven Project Management Capabilities (DDPMC). A capability-based view is adopted throughout the study and it is argued that BI would be more effective in terms of providing project value if the analytical information is converted into managerial capabilities and put into the project planning, monitoring, risk management, resource allocation and decision-making processes. Quantitative research with cross sectional research design was used, and 380 professionals of project-based organizations in Jordan were targeted for data collection. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to test the proposed relationships. Results show that BI plays a major role in affecting DDPMC towards Sustainable Project Performance. DDPMC also has a strong positive impact on Sustainable Project Performance. Moreover, mediation analyses reveal that the link between BI and Sustainable Project Performance is partially explained by better data-driven managerial capabilities, revealing that DDPMC has a significant mediating role. The study's novel contribution is that it brings all three fields together within a single schema, and that it proposes that DDPMC is one of the significant mechanisms by which BI may contribute to economic, environmental and social project outcomes. The results also highlight the importance of organizations investing not only in BI technologies but in building their analytical and data-driven project management skills.

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## 1. Introduction

Projects are now the primary mode of strategic change, innovation, digital transformation and sustainability initiatives for organizations. But, the complexity of projects, uncertainty and information intensity have thrown out the traditional managerial experience and retrospective reporting project management ideas. Meanwhile, project success is no longer just measured by cost, schedule and quality but added value for project stakeholders, long-term benefits, and environmental and social impacts (Arroyo, 2026; Shamshuddin et al., 2025). Therefore, organizations are expected to come up with ways to work efficiently on the project and also come up with sustainable results.

In this context, Business Intelligence (BI) has become a valuable tool of the organizations for turning massive amounts of data into useful and actionable information. BI can help managers get greater visibility into projects, with analytics, dashboards, reporting, and data visualization highlighting project schedules, costs, resources, risks, and performance deviations that may arise. New studies suggest that BI can help to improve project performance, increase information availability and quality for project decisions (Nazarian-Jashnabadi et al., 2024). Likewise, there is a correlation between analytics-based information and project outcome in that the information would influence better decision-making under uncertainty (Oluwafunmilayo Esan et al., 2024).

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However, using a BI technology is not enough to ensure better results in the project. The value of these is based on the capacity of the organization to transform technological resources and analytical information into effective managerial capacities (Tarawneh & Alzghoul, 2026). (Arroyo, 2026; Oluwafunmilayo Esan et al., 2024) state that resources of analytics help performance when combined with organizational capabilities. Similarly, (Belhadi et al., 2019; Jung & Jeong, 2020) revealed that BI helps promote sustainability performance using analytics capability, (Mohsen, 2023) demonstrated that the digital resources can enhance project performance after maturing into organizational capability and digital project practice (Alrifae et al., 2026).

This is a good example of Data-Driven Project Management Capabilities (DDPMC) and the value of such capabilities. These capabilities are related to the capability of project teams to systematically find project-related data, analyze it, interpret it and apply it so that they can plan, monitor, allocate resources, manage risks, and make corrective decisions. Data-driven project management can help project teams spot deviations sooner, allocate resources more efficiently, identify potential risks in advance, and take quicker action on shifting project circumstances than relying on intuition or delayed information. (Isiaku & Adalier, 2024; Nguyen et al., 2025) highlight the crucial role of data-driven decision making in sustainable project management by focusing on enhancing resource use, handling risks, optimizing operations, and increasing the long-term value of projects.

Concurrently, Sustainable Project Performance (SPP) is gaining more and more importance in modern project management. This idea is an extension of the traditional project performance idea of whether or not projects create economic value, to include the environmental and social impacts. Consequently, a project that is completed on schedule and within budget may not be truly successful if the environmental effects are negative, the stakeholders are not positively affected or the benefits at the end of the project are minimal. Research has been conducted on how the application of sustainability concepts in project management, positively affects project success and long-term value creation (Jaradat et al., 2024; Nguyen et al., 2025).

There is now some evidence that BI and analytical capabilities can help enable these sustainability-related results. (Rahardjo et al., 2023) showed that BI and big data analytics capabilities have a positive effect on sustainability performance, (Pankowska, 2019) found a positive impact of BI on project performance. (Rahardjo et al., 2023; Waqar et al., 2025) also noted the importance of data-driven approaches in sustainable project management (Tawalbeh et al., 2025). It is suggested that BI is not only impacting sustainable project performance by adoption of technology, but also because of the capability that BI can give project teams to turn data into actionable and effective managerial decisions.

Even with these advances, there are critical unfilled gaps. Previous studies in BI mainly study the role of BI in the organizational performance with a few studies on project performance. Additionally, project analytics studies have predominantly focused on project outcomes and whether the project is successful or not, but not on sustainable project performance. Furthermore, little consideration has been paid to the Data-Driven Project Management Capabilities as the enabler to Sustainable Project Performance through BI.

As a result, this research examines the connection among Business Intelligence and Data-Driven Project Management Capabilities and Sustainable Project Performance. It suggests that BI will improve data-driven project management capabilities, and that these will improve sustainable project outcomes. This study makes a contribution to the nexus of business intelligence, project management, digital capabilities and sustainability research as it places DDPMC as a mediation mechanism and as a means of finding out how organizations can bridge the gap between the value of BI resources, and the value of sustainable projects.

## 2. Literature Review and Hypotheses Development

### *2.1 Business Intelligence and Data-Driven Project Management Capabilities*

Business Intelligence (BI) is a term that describes the processes and technologies that a business uses to gather, build, analyze and change data into meaningful information for management decision making. BI systems include analytical tools, dashboards, reporting systems, data visualization, and data integration to enable managers to gain up-to-the-minute advantages in what's taking place within the company and its operations (Ali & Zafer, 2022). These tools may help you gain a better picture of your project schedule, budget, resources, risks, quality, and any potential issues that are arising (Pantović et al., 2024).

But the technology to provide BI is not guaranteed to provide good project management. The quality of their value is reliant upon the ability of project teams to understand and put the analytical information into project management practice. (Mazzaro et al., 2024) state that data resources only lead to value when they become something else, such as higher order analytical capabilities. In the same way, (Rahaman et al., 2024) stated that BI can increase the capability in big data analytics, which means that technical resources can help build organizational capabilities to make decisions based on big data.

For the purposes of this project, Data-Driven Project Management Capabilities (DDPMC) are the capacity of project teams to interpret and apply data systematically for planning, monitoring, resource allocation, risk management, forecasting and corrective action (Aldarab'ah et al., 2026). BI offers the information infrastructure necessary for these capabilities through better data availability, integration, accuracy and accessibility. More recently, evidence suggests that BI can enhance project

management and other practices and strengthen the usage of information during the project's execution (Alshareef & Emeagwali, 2026). Expect, then, that those organizations that have better BI will have more capabilities for project management using data-driven approaches.

**$H_1$:** *Business Intelligence has a positive effect on Data-Driven Project Management Capabilities.*

*2.2 Data-Driven Project Management Capabilities and Sustainable Project Performance*

Data-driven project management supports project teams in moving beyond “reactive” decision making towards more ‘predictive’ evidence-based and adaptive project management. Project information can be analyzed systematically, allowing for the identification of potential delays, the anticipation of risks, the optimization of resource allocations, the monitoring of project performance and a swift response to project changes.

These are especially relevant to Sustainable Project Performance (SPP), which seeks to expand the definition of project success to the economic, environmental and social qualities (Pantović et al., 2024). For a project to be sustainable, they need to be performed efficiently, minimizing the negative impact on the environment, generating long-term gain and taking into account the interests of the project stakeholders.

Recent studies emphasize the significance of data-driven decision-making in the field of sustainable project management, demonstrating how analytical methods can enhance the utilization of resources, risk management systems, operational efficiency, and the overall value of projects (Munir et al., 2023; Gupta et al., 2025). Data can also help managers assess different project options based on a much more comprehensive performance data than just based on short term financial or operational data.

Therefore, a project team that has solid DDPMC is more able to detect opportunities for wasteful use of resources, is better prepared to foresee sustainability risks, meet stakeholder demands and is able to balance economic, environmental and social issues. These capabilities should then be able to have a positive impact on the sustainable outcomes of a project.

**$H_2$:** *Data-Driven Project Management Capabilities have a positive effect on Sustainable Project Performance.*

*2.3 Business Intelligence and Sustainable Project Performance*

BI can also directly contribute in improving sustainable project performance by providing organizations with the ability to make more informed, timely and transparent project decisions. Integrated and real-time information can set up better monitoring, lessen uncertainty, reveal inefficiencies and provide increased managerial oversight of project activities (Vergara et al., 2025).

The results from previous studies justify the use of BI for good performance. According to (Philip, 2026), BI is significant and positive on the project performance, which proves its potential to reinforce the project performance by better utilization of information. In the same vein, (Mannava et al., 2025) indicated that BI can help in sustainability performance, implying that analytical information can aid in economic, environmental and social objectives.

BI can assist project managers in monitoring resource usage, sustainability indicators, and identify any misalignment in environmental or operational aspects, as well as assessing the long-term impact of project decisions in sustainable project settings. For this reason, BI can help to deliver the information base needed to embed sustainability in project planning and controlling. From this assumption, it is expected that the higher the BI capability, the better the sustainable performance of the project.

**$H_3$:** *Business Intelligence has a positive effect on Sustainable Project Performance.*

*2.4 The Mediating Role of Data-Driven Project Management Capabilities*

BI can deliver value to an organization through high-quality analyti□al information; value does not always □ome from the technology. The resource and capability perspective indicates that performance gains go beyond the mere availability of technological resources, as they are converted into organizational capabilities, incorporated in managerial processes.

This argument is supported by previous research. (Jum’a et al., 2024) revealed the big data analytics capability as an important mechanism how BI can contribute to sustainability performance. Similarly, (Battisti et al., 2022) demonstrated that a partial explanation of the contribution of BI to project performance is project quality management. These findings suggest that management skills may be a link between technology resources and results.

In the current study, DDPMC are suggested as such a mechanism. BI offers information, analyses, projections, and metrics being integrated and DDPMC test the ability of project managers to make use of these results to plan, allocate resources, respond to risks, monitor, and take corrective actions. These capabilities enable BI data to be turned into decisions that enhance efficiency and decrease waste, meet stakeholder needs and align with economic, environmental, and social project goals.

It is thus hoped that BI can also enhance sustainable project performance in part because it builds the managerial competencies and skills essential to ensuring that analytical information can be leveraged for effective project actions. This line of thinking leads to the following hypothesis:

**H4:** *Data-Driven Project Management Capabilities mediate the positive relationship between Business Intelligence and Sustainable Project Performance.*

## 3. Conceptual Framework

This study's conceptual framework presents how Business Intelligence (BI) helps towards Sustainable Project Performance (SPP) by building Data-Driven Project Management Capabilities (DDPMC). The framework is grounded in a capability-oriented perspective, implying that technologies only create more value for an organization when translated into a capability and incorporated in the organizational processes. For this study, BI is the technological and informational resource that allows organizations to map, analyses and share data related to their projects and DDPMC is the managerial skill that allows the usage of that data to guide their project decisions and activities.

The proposed structure is that BI will directly strengthen DDPMC through enhancement of project information, availability, quality, integration and accessibility. Better DDPMC then result in better sustainable project performance through evidence-based planning and resource optimization, proactive risk management, continuous monitoring and sustainability-oriented decision making. Beyond this, BI will have a positive direct impact on SPP, as information needs can be solved through timely and analytically-based information, which allows for better project control and sustainability decisions. Consequently, it is proposed that DDPMC are a mediating mechanism by which BI resources are transformed into sustainable project outcomes.

### The Proposed Conceptual Model

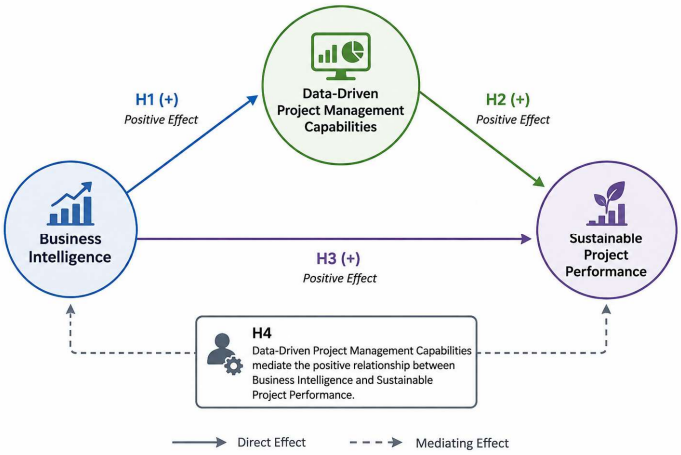


**Fig. 1**. model of study

## 4. Research Methodology

The research type used in this study is quantitative, explanatory, and cross-sectional research to find the relationship between Business Intelligence (BI), Data-Driven Project Management Capabilities (DDPMC), and Sustainable Project Performance (SPP). The study aims to empirically test the proposed relationships between latent constructs and to examine the direct and mediating effects, thus, the quantitative approach is suitable. The data will be gathered at a fixed time using a questionnaire designed in a structured format that is to be given to the professionals directly involved in project related activities.

The study target population is all employees who in their jobs are associated with project-based organizations in the Kingdom of Jordan such as project manager, project team leaders, project coordinators, project engineers, supervisors, and other employees directly associated with project planning, implementation, monitoring, controlling and decision making. The following respondents are deemed appropriate since they have enough knowledge about the project activities, the application of the Business Intelligence and data-based systems and project performance. The unit of analysis, is the single professional who is engaged in the project management or project support of an organization

The total number of respondents to the study will be 380. This sample size is deemed to be adequate to perform multivariate analysis and Partial Least Squares Structural Equation Modeling (PLS-SEM) as well as be adequate for reliable assessment of the proposed direct and indirect relationship. Organizations will be chosen from those which are actively engaged in projects and are using digital or data-based systems in their project management. Purposive sampling method will be used as the study requires the respondents who have firsthand knowledge on project management activities and data utilization in the organization. To ensure the diversity and representativeness of the data collected, respondents will be sourced from various organizations and sectors where possible.

To collect the data, a structured questionnaire will be designed, based on existing measures in the literature. The questionnaire will have four sections: The first section will gather demographic and professional data of the respondents such as position, experience, organizational sector, and project experience. The other sections will measure BI, DDPMC and SPP. BI items will assess the integration, analysis, visualization and on-time delivery of information to projects. DDPMC Items will evaluate the degree of systematic DDPM by project teams during project planning, forecasting, resource allocation, risk management, performance monitoring and corrective decision making. The measurement of SPP will be based on indicators that relate the economic, environmental and social aspects of project performance. Each measurement item will use five-point Likert response format from 1 (strongly disagree) to 5 (strongly agree).

The questionnaire will be content-validated, clarified, and evaluated for relevance by academic practitioners and experts who have an experience with project management, Business Intelligence and sustainability before the main survey will be conducted. A pilot will also be carried out with a limited number of participants that share some of the characteristics of the participants in the main study. Results from this stage will be utilized to make adjustments to unclear wording in the questionnaire and enhance clarity of the questions prior to the final distribution. The questionnaire will be sent electronically and also to individual eligible respondents, if possible. It will be voluntary and respondents will be made aware that their answers will be anonymous and for academic uses only. In order to reduce potential common method bias, several procedural steps will be taken: respondents will not be identified, the wording will be clear and concise, the constructs of predictors and outcomes will be separated within the questionnaire, and the test takers will be informed that there are no “right” or “wrong” answers to be given (Podsakoff et al., 2003). Partial Least Squares Structural Equation Modeling (PLS-SEM) will be used to analyze the collected data. Prior to testing the proposed hypotheses, the data will be screened for missing values, outliers, and response quality. The demographic and professional characteristics of the respondents will also be summarized by using descriptive statistics. The PLS-SEM analysis will thereafter follow two key phases. First, the measurement model will be evaluated based on the indicator loadings, Cronbach's alpha, composite reliability, convergent validity – Average Variance Extracted (AVE), and discriminant validity – appropriate criteria, like HTMT. Second, structural model will be assessed by collinearity diagnostics, standardized path coefficients, coefficient of determination ($R^2$), effect size ($f^2$), predictive relevance ($Q^2$), and statistical significance of the suggested relationships (Sarstedt et al., 2022).

Finally, bootstrapping procedure (with 5,000 resamples) will be used to evaluate the significance of the direct and indirect relationships. H1 will consider the effect of BI on DDPMC, H2 will consider the effect of DDPMC on SPP and H3 will consider the direct effect of BI on SPP. The indirect effect will be analyzed to evaluate the mediating role of DDPMC in the relationship between BI and SPP (H4). In this way, the study will be able to test if Business Intelligence has a direct impact on Sustainable Project Performance and if the impact is mediated by increased Data-Driven Project Management Capabilities.

## 5. Results

In total, 380 valid questionnaires were used in the final analysis. Data were first scrubbed for missing data, partial response, and possibly response-pattern issues. No significant data-quality issues were noted and all 380 observations were kept for the subsequent analysis. These were first descriptively analyzed to describe the respondents and then measured and structurally analyzed by applying the PLS-SEM.

### *5.1 Respondent Profile*

The respondents included various project-related roles and organizational areas, offering a mix of project experiences and professional roles. The male and female respondents were 61.3% and 38.7% respectively. Most had over 5 years of professional experience, which meant that most of the sample group were familiar with the decision-making processes in their companies and the BI applications used in their projects.

**Table 1**
Respondent Characteristics

| Characteristic | Category | Frequency | Percentage |
|---|---|---|---|
| Gender | Male | 233 | 61.3% |
| | Female | 147 | 38.7% |
| Position | Project Manager | 102 | 26.8% |
| | Project Team Leader | 83 | 21.8% |
| | Project Coordinator | 74 | 19.5% |
| | Engineer/Supervisor | 67 | 17.6% |
| | Other Project Professional | 54 | 14.2% |
| Experience | 1–5 years | 71 | 18.7% |
| | 6–10 years | 118 | 31.1% |
| | 11–15 years | 103 | 27.1% |
| | More than 15 years | 88 | 23.2% |
| Sector | Construction | 96 | 25.3% |
| | Information Technology | 74 | 19.5% |
| | Manufacturing | 68 | 17.9% |
| | Services | 86 | 22.6% |
| | Energy/Infrastructure | 56 | 14.7% |

*5.2 Descriptive Statistics and Correlations*

The descriptive results show a relatively favorable perception for the three constructs. Business Intelligence had a mean score of 3.86; Sustainable Project Performance had a mean score of 3.84; and Data-Driven Project Management Capabilities was at 3.79. The correlations among the constructs indicated a positive and moderate relationship, supporting the proposed relationships but not suggesting too much overlap between the constructs.

**Table 2**
Descriptive Statistics and Correlations

| Construct | Mean | SD | BI | DDPMC | SPP |
|---|---|---|---|---|---|
| Business Intelligence (BI) | 3.86 | 0.67 | 0.806 | | |
| Data-Driven Project Management Capabilities (DDPMC) | 3.79 | 0.71 | 0.560 | 0.820 | |
| Sustainable Project Performance (SPP) | 3.84 | 0.65 | 0.519 | 0.620 | 0.809 |

*Note: Diagonal values in bold represent the square roots of AVE.*

*5.3 Measurement Model Assessment*

Indicator reliability, internal consistency reliability, convergent validity and discriminant validity were used to assess the measurement model. As seen in Table 3, all the indicator loadings were more than the recommended 0.70, with the numbers between 0.744 and 0.862. The composite reliability values varied from 0.917 to 0.925 and Cronbach's alpha between 0.891 and 0.902 indicated satisfactory internal consistency.

Also, convergent validity was achieved, since the AVEs were higher than the recommended value of 0.50 ranging from 0.650 to 0.673.

**Table 3**
**Measurement Model Results**

| Construct | Item | Loading | Cronbach's Alpha | rho_A | CR | AVE |
|---|---|---|---|---|---|---|
| Business Intelligence | BI1 | 0.758 | 0.891 | 0.895 | 0.917 | 0.650 |
| | BI2 | 0.801 | | | | |
| | BI3 | 0.824 | | | | |
| | BI4 | 0.846 | | | | |
| | BI5 | 0.789 | | | | |
| | BI6 | 0.815 | | | | |
| Data-Driven Project Management Capabilities | DDPMC1 | 0.771 | 0.902 | 0.912 | 0.925 | 0.673 |
| | DDPMC2 | 0.834 | | | | |
| | DDPMC3 | 0.862 | | | | |
| | DDPMC4 | 0.808 | | | | |
| | DDPMC5 | 0.851 | | | | |
| | DDPMC6 | 0.793 | | | | |
| Sustainable Project Performance | SPP1 | 0.744 | 0.893 | 0.901 | 0.919 | 0.654 |
| | SPP2 | 0.806 | | | | |
| | SPP3 | 0.852 | | | | |
| | SPP4 | 0.829 | | | | |
| | SPP5 | 0.781 | | | | |
| | SPP6 | 0.837 | | | | |

The Heterotrait-Monotrait ratio (HTMT) was used to measure discriminant validity. All the HTMT values were below the conservative value of 0.85 thus showing the empirical distinctiveness of the three constructs.

**Table 4**
HTMT Discriminant Validity

| Construct | BI | DDPMC | SPP |
|---|---|---|---|
| BI | — | | |
| DDPMC | 0.741 | — | |
| SPP | 0.684 | 0.792 | — |

Additionally, potential common method bias was evaluated. The first factor could explain about 39.2% of the total variance and was less than the 50% generally accepted limit. Moreover, the VIF values for full-collinearity were between 1.42 and 2.18, which indicated that common method bias was not a significant problem with the data.

*5.4 Structural Model Assessment*

Once the measurement model has been assessed for reliability and validity, the structural model was assessed. The Variance Inflation Factor (VIF) was initially used to check for the presence of collinearity. Inner VIF values were less than 3.0, which means that there was no problematic multicollinearity.

The explanatory power of the model was satisfactory. BI accounted for 31.4% of the variance in DDPMC ($R^2 = 0.314$) while the combined variance of BI and DDPMC contributed about 42.7% of the variance in Sustainable Project Performance ($R^2 = 0.427$). The Q2 values of both endogenous constructs were higher than zero, hence have predictive relevance.

**Table 5**
Explanatory and Predictive Power

| Endogenous Construct | $R^2$ | Adjusted $R^2$ | $Q^2$ |
|---|---|---|---|
| DDPMC | 0.314 | 0.312 | 0.198 |
| Sustainable Project Performance | 0.427 | 0.424 | 0.283 |

Additional evidence of satisfactory model fit was provided by the standardized root mean square residual (SRMR = 0.061) which was below the recommended value of 0.08.

*5.5 Hypothesis Testing*

To assess the significance of the proposed structural relationships, resampling was conducted with 5,000 samples using a bootstrapping method. The results are tabulated in Table 6.

Business Intelligence was a strong positive influence on Data-Driven Project Management Capabilities ($\beta = 0.560$, $t = 10.980$, $p < 0.001$). Thus, H1 was supported. This outcome suggests that improved BI capabilities aid in the systematic incorporation of data in project planning, project monitoring, risk management and decision making.

In addition, DDPMC positively and significantly influenced Sustainable Project Performance ($\beta = 0.480$, $t = 8.421$, $p < 0.001$), thus substantiating the H2. The systematic application of data to project management can help improve the economic, environmental and social outcomes of a project, this finding suggests.

BI also directly positively affected Sustainable Project Performance ($\beta = 0.250$, $t = 4.237$, $p < 0.001$) which supported H3. Thus, even with consideration of the effect of DDPMC, BI makes a contribution toward sustainable project outcomes.

**Table 6**
Direct Effects and Hypothesis Testing

| Hypothesis | Relationship | β | SE | t-value | p-value | $f^2$ | Decision |
|---|---|---|---|---|---|---|---|
| **$H_1$** | BI → DDPMC | 0.560 | 0.051 | 10.980 | <0.001 | 0.458 | Supported |
| **$H_2$** | DDPMC → SPP | 0.480 | 0.057 | 8.421 | <0.001 | 0.276 | Supported |
| **$H_3$** | BI → SPP | 0.250 | 0.059 | 4.237 | <0.001 | 0.075 | Supported |

The result of effect size analysis indicated that BI had a large effect on DDPMC ($f^2 = 0.458$). DDPMC showed a moderate effect ($f^2 = 0.276$) and direct effect of BI on SPP was relatively small ($f^2 = 0.075$). These findings indicate that a significant part of the benefits that BI can give to the sustainable project result is through its data-driven project management capabilities.

*5.6 Mediating Effect of Data-Driven Project Management Capabilities*

The specific indirect pathway from BI to SPP via DDPMC was evaluated to examine the mediating effect of H4. The indirect path was positive and significant ($\beta = 0.269$, $t = 6.725$, $p < 0.001$) and the bootstrapped 95% confidence interval for this path did not include zero (0.192, 0.347).

Meanwhile, the direct path from BI to SPP was still positively and statistically significant when the mediator was added to the equation ($\beta = 0.250$, $p < 0.001$). Thus, DDPMC proved to be a complementary partial mediator between BI and Sustainable Project Performance.

**Table 7**
Mediation Analysis

| Relationship | Direct Effect | Indirect Effect | Total Effect | t-value of Indirect Effect | p-value | Mediation |
|---|---|---|---|---|---|---|
| BI → DDPMC → SPP | 0.250 | 0.269 | 0.519 | 6.725 | <0.001 | Complementary Partial Mediation |

The indirect effect had interested around 51.8% of the total impact of BI on Sustainable Project Performance. This discovery suggests that BI not only directly affects project sustainability but also a significant percentage of the impact can be found in its role in enabling organizations to turn data and analytical insights into sound managerial decisions and behaviors. Thus, H4 was accepted.

*5.7 Summary of Hypothesis Testing*

**Table 8**
Summary of Hypotheses

| Hypothesis | Proposed Relationship | Result |
|---|---|---|
| **$H_1$** | BI positively affects DDPMC | Supported |
| **$H_2$** | DDPMC positively affects SPP | Supported |
| **$H_3$** | BI positively affects SPP | Supported |
| **$H_4$** | DDPMC mediates the relationship between BI and SPP | Supported |

Overall, the results provide support for the proposed conceptual model. Overall, Business Intelligence was found to have a significant contribution in enhancing Data-Driven Project Management Capabilities and DDPMC was found to be an important predictor for Sustainable Project Performance. While BI also had a direct impact on sustainable project outcomes, the strong indirect impact supports the idea that Data-Driven Project Management Capabilities is an important mechanism by which Business Intelligence becomes sustainable project value.

## 6. Discussion

The conclusions of this study offer empirical evidence of the relationships between the constructs of Business Intelligence (BI), Data-Driven Project Management Capabilities (DDPMC) and Sustainable Project Performance (SPP). In sum, the findings support that BI can help achieve sustainable project outcomes, both directly and indirectly, by fostering the growth of data-driven project management skills. These findings confirm that the essence of BI is not just data and analytical tools, but also the capacity of project teams to use the data to make effective management decisions.

The first hypothesis suggested a positive effect of BI on the DDPMC. The findings confirmed this, and showed that, the better an organization is at BI, the more integrated its use of data in project planning, monitoring, forecasting, resource allocation, and risk management. This is to accord with the capability-based view that postulates that technological resources are likely to be more valuable in their transformed state into organizational and managerial capabilities. It also agrees with (Belhadi et al., 2019) that resources and processes associated with analytics need to be embedded within organizational processes and capabilities to ensure performance gains. Likewise, (Hangl et al., 2022; Jung & Jeong, 2020) showed that BI affects development of analytical capabilities (Hawwa et al., 2026). Thus, BI seems to be foundational element of information, which can be used in a project environment to provide more systematic and evidence-based decision making by the project team (Allahham et al., 2024).

The second hypothesis tested was the impact of DDPMC on Sustainable Project Performance. The positive and significant relationship suggests that systematic use of data in project management activities is likely to result in better economic, environmental and social impacts of projects. This outcome is aligned with the fact that the requirements for sustainability-oriented project management are gaining in importance, and that in this context information in particular and analytical decision-making processes play a significant role (Abualrejal et al., 2022). Managers can leverage the data-driven capabilities to spot inefficiencies in resource use, predict risks, mitigate unnecessary expenses, track sustainability metrics, and make more informed decisions in response to shifting stakeholder needs. Similar results were found by (Rahardjo et al., 2023; Waqar et al., 2025) who have emphasized the role of data-driven decision making in resource optimization, risk management and sustainable excellence in project management.

The third hypothesis was that there would be a direct relationship between BI and Sustainable Project Performance. The results also confirmed this relation, meaning that BI can be used to better and faster identify deviations from the expected project performance and increase the visibility of the information to improve the project outcome in a more sustainable way. This result aligns with existing evidence that BI positively impacts project performance (Alshareef & Emeagwali, 2026; Mazzaro et al., 2024) and overall sustainability performance (Salah & Alzghoul, 2024). As a consequence, BI can give project managers the information they want to assess the traditional aspects of project performance as well as economic, social and environmental consequences of project decisions.

Most importantly the results confirmed mediator's role of DDPMC between BI and SPP. The significant indirect effect means that a large part of the impact of BI on a sustainable project result comes from whether the project team is able to apply data in a systematic manner in project management decision making (Dalain et al., 2025). The continued significance of the direct relationship suggests complementary partial mediation. This indicates that BI's influence on sustainable project performance occurs on several fronts, but improving the skills of data-driven project management is one path by which BI information turns into project value.

This result offers a more complex and multifaceted perspective on the BI-performance relationship. The mere introduction of BI systems won't be enough to provide lasting project results. The key is to have managerial routines, analytical skills and project practices so that project teams can make sense of and act on the information provided by BI. The results hence focus the attention from technical adoption to the effective use on the technology in the project management processes.

## 7. Theoretical Implications

This paper contributes in a number of theoretical ways to the literature. Firstly, it takes BI research to a new level of focus - the project-management context instead of organizational-performance context. Compared with past studies that have been mainly devoted to the impact of BI on a firm's performance, the present study has shown that BI can be looked upon in terms of a sustainable project output.

Second, the study proposes a new project-level capability, called Data-Driven Project Management Capabilities, that connects BI resources and sustainable project performance. This piece makes a contribution to understanding how analytical technologies are translated into managerial value. The framework does not equate BI directly with performance, but recognizes DDPMC as a key intermediate capability for project teams to use in turning information into project decisions.

The third one is that the study extends the literature of sustainable project management by incorporating digital intelligence and data capabilities in the discourse on project sustainability. Performance of sustainable projects has been looked at from sustainable practices, stakeholder management, leadership and environmental strategies many times. The present study extends this view by illustrating that digital and analytical competencies can also prove to be relevant contributors to sustainable project results.

Finally, the mediation finding also provides support to capability-based reasoning, which suggests that the technological resources and managerial capabilities are complementary. BI is used to provide analytical resources while DDPMC are responsible for determining effectiveness of utilization. It's a more holistic account of the positive contribution digital technologies can make to the sustainable value creation of project-based organizations.

## 8. Practical Implications

The results have also implications for the project-based organization and for managers. However, it is important for organizations to understand that investment in BI platforms is not likely to return the desired project benefits unless project teams are empowered with the skills to leverage the analytical information. Hence, investments in BI must go hand-in-hand with managerial and organizational activities aimed at reinforcing project management based on data.

Embracing data and analysis should be combined with key project-management processes such as planning, scheduling, resource management, risk management, tracking project performance and making corrective decisions. Managers need to adopt real-time dashboards, predictive analytics and performance indicators to guide proactive project management, rather than relying on the intuition or historical reports.

Project manager and project team member analytical skills need to be developed as well. Training may be on interpreting data and thinking analytically, on using dashboards, on forecasting and making decisions based on evidence. All of this can assist the project teams to put into practice the outcomes the BI delivers.

Additionally, sustainability indicators should be integrated in BI and project-monitoring systems. Project dashboards should go beyond just cost, time, and operational performance, incorporating metrics that measure resource efficiency, environmental outcomes, stakeholder value, social results, and long-term project benefits. This would enable project teams to start taking sustainability into account during the entire project life cycle and not just when the project is done.

Senior management also has a significant role to play in encouraging a culture of data within the organization. Leaders need to promote the use of analytical evidence for decision making; provide facilitation opportunities to share information across functions; and ensure that project teams are able to gain access to reliable and timely information. Companies can achieve more value from investments in BI and increase the sustainable performance of their projects through the use of the right combination of technology and "right" organizational qualities.

## 9. Conclusion

In this paper it is explored how Business Intelligence can be helpful for Sustainable Project Performance by providing Data-Driven Project Management Capabilities. The proposed framework was built on the premise that BI is useful for providing useful analytical information; and DDPMC is useful for helping project teams turn this into effective managerial decisions and sustainable project outcomes.

All relationships proposed were supported by the findings. BI positively impacted DDPMC and Sustainable Project Performance as well as DDPMC positively influenced Sustainable Project Performance. In addition, the mediation analysis revealed that DDPMC mediate the relationship between BI and SPP to some extent. These findings illustrate how much the role of BI for the sustainable project performance is dependent on the organization's capacity to set up BI information within project management processes.

The study thus points out an important difference between having the Business Intelligence technologies and having the capabilities needed to put them to good use. Beyond adopting BI, organizations can work towards building data-empowered project management competencies to achieve better sustainable project outcomes. The analytical technologies coupled with

the evidence-based project practices enables the organization to have better resource use, better management responsiveness, better risk management, and better economic, environmental, and social performance in their projects.

## 10. Limitations and Future Research

This study has some limitations that could be beneficial for future research. First, as a cross-sectional design, the study is unable to assess the change in BI capabilities and project performance over time, as respondents' perceptions are only assessed at one time. Longitudinal designs could be used in future research to explore the evolution of data-driven project management skills and the impact over time on sustainable project outcomes.

Second, the study only uses self-reported data from surveys, which can be subject to people's perceptions and common method bias. While procedural and statistical tools may contribute to reducing the concerns, future studies may include survey data and objective project-performance indicators like project cost variance, schedule performance, or resource efficiency, environmental measures or stakeholder satisfaction.

Third, a single national context is studied on the subject of PBOs. The proposed relationships may be impacted by differences in digital infrastructure, organizational culture, regulatory environments and sustainability priorities. Thus, the model could be replicated in other countries and institutions to assess for generalizability.

Fourth, Sustainable Project Performance is investigated as an overall construct consisting of economic, environmental and social components. These dimensions are worthwhile to be studied separately in future research to see if the BI and DDPMC has a different impact on the different sustainability dimensions.

Last, other organizational mechanisms can enhance or dilute the proposed relationships. Potential future research might include the roles of moderators, including top management support, organizational data culture, maturity in digitalization, or use of AI-enabled data analytics capability. This model can also be further developed to include other mediators like project agility, decision quality, project knowledge integration, or organizational learning.

In general, the interactions between technological resources and managerial capabilities to enhance sustainable project performance should be further investigated. This research can help to develop the understanding of meaningful and sustainable value creation within project contexts through digital transformation.

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