

Article

Statistically Significant Differences in AI Support Levels for Project Management between SMEs and Large Enterprises

Polona Tominc¹, Dijana Oreški², Vesna Čančer¹ and Maja Rožman^{1,*}

¹ Faculty of Economics and Business, University of Maribor, 2000 Maribor, Slovenia; polona.tominc@um.si (P.T.); vesna.cancer@um.si (V.Č.)

² Faculty of Organization and Informatics, University of Zagreb, 10000 Zagreb, Croatia; dijoresk@foi.hr

* Correspondence: maja.rozman1@um.si

Abstract: Background: This article delves into an in-depth analysis of the statistically significant differences in AI support levels for project management between SMEs and large enterprises. The research was conducted based on a comprehensive survey encompassing a sample of 473 SMEs and large Slovenian enterprises. Methods: To validate the observed differences, statistical analysis, specifically the Mann–Whitney U test, was employed. Results: The results confirm the presence of statistically significant differences between SMEs and large enterprises across multiple dimensions of AI support in project management. Large enterprises exhibit on average a higher level of AI adoption across all five AI utilization dimensions. Specifically, large enterprises scored significantly higher ($p < 0.05$) in AI adopting strategies and in adopting AI technologies for project tasks and team creation. This study's findings also underscored the significant differences ($p < 0.05$) between SMEs and large enterprises in their adoption and utilization of AI technologies for project management purposes. While large enterprises scored above 4 for several dimensions, with the highest average score assessed (mean value 4.46 on 1 to 5 scale) for the usage of predictive Analytics Tools to improve the work on the project, SMEs' average levels, on the other hand, were all below 4. SMEs in particular may lag in incorporating AI into various project activities due to several factors such as resource constraints, limited access to AI expertise, or risk aversion. Conclusions: The results underscore the need for targeted strategies to enhance AI adoption in SMEs and leverage its benefits for successful project implementation and strengthen the company's competitiveness.

Keywords: enterprises; project management; leadership; artificial intelligence



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1. Introduction

Artificial intelligence (AI) has emerged as a transformative technology with vast potential to revolutionize various industries and sectors. In recent years, AI has gained significant traction in enterprises across the globe, offering unprecedented opportunities to enhance efficiency, improve decision-making processes, and drive innovation [1]. The rapid advancements in AI technologies have opened new avenues for enterprises to leverage intelligent systems and algorithms to automate tasks, gain insights from large datasets, and augment human capabilities [2]. Enterprises are increasingly integrating AI into their operations and strategies to streamline processes, boost productivity, and gain a competitive edge in the marketplace. From finance and healthcare to manufacturing and customer service, AI is transforming how businesses operate and make critical decisions [3,4]. Enterprises can utilize AI-powered solutions for various purposes, such as data analysis, predictive modeling, intelligent automation, personalization, and customer relationship management. However, incorporating AI into enterprise operations is not without its challenges [5,6]. The successful integration of AI requires a comprehensive understanding of the technology, a clear roadmap for implementation, and effective change-management strategies [7]. The integration of AI into project management presents a significant area of study due to

its potential to transform how projects are planned, executed fundamentally, and monitored [8]. Modern project management is increasingly confronted with complex challenges including data overload, dynamic project requirements, and the need for real-time decision making [8,9]. AI offers solutions to these challenges through advanced data analytics, predictive modeling, and intelligent automation, thereby enhancing the efficiency and effectiveness of project management practices [7]. There is a growing recognition that traditional project management tools and methodologies may not be sufficient to address the evolving landscape of project demands. AI technologies can bridge this gap by providing innovative tools that cater to the sophisticated needs of contemporary projects [1,9]. AI's capability to process vast amounts of data and provide insights can significantly improve decision-making processes in project management. AI algorithms can anticipate project risks and propose mitigation strategies, thereby reducing uncertainties and improving project outcomes [4,6,8]. The industry trend shows a rising demand for project management professionals who are adept at integrating AI into their workflows [8,10]. Our study addresses this emerging need by exploring the current state of AI in project management and offering insights into future trends and requirements. AI's impact on project management is not confined to a specific sector but is a global phenomenon with relevance across various industries. By studying AI in the context of project management, our research contributes valuable knowledge applicable across multiple domains. By addressing these points, our study underscores the importance of researching AI in project management and its potential to revolutionize this field. Our findings aim to contribute to the broader understanding of AI applications in project management, offering guidance to practitioners and informing future research directions. Thus, our study contributes novel insights into AI in project management by specifically exploring the variance in AI adoption between SMEs and large enterprises in Slovenia. In addressing the emergent dynamics of AI in project management, our study delves into the relatively uncharted territory of AI adoption variances between SMEs and large enterprises within the Slovenian context. This focus is not only distinct within the sphere of global research but also pivotal in understanding the nuanced implications of AI in varied enterprise scales and geographic settings. By honing in on Slovenia, a region less represented in the current literature, our research adds a unique dimension to the broader discourse on AI's transformative potential in project management. Furthermore, our findings have practical implications, offering new perspectives on how SMEs can overcome barriers to AI adoption, which is crucial for enhancing their project management capabilities and overall competitiveness.

Despite the remarkable progress in AI, its adoption remains relatively low among small- and medium-sized enterprises (SMEs) [11]. There are several factors contributing to this limited uptake of AI in SMEs. One of the main reasons is the perception that AI is primarily accessible and affordable only for large corporations with significant resources and technical expertise [12]. SMEs often face budget constraints and limited IT infrastructure, which can make it challenging to embark on AI initiatives [13]. Additionally, there may be a lack of awareness and understanding of the potential benefits that AI can bring to SMEs. Many business owners and decision makers may be unfamiliar with the specific use cases where AI can be applied within their operations [14]. Furthermore, there might be concerns about the complexity of integrating AI solutions into existing workflows and systems, as well as the potential impact on the workforce. However, SMEs must recognize the immense potential of AI and the competitive advantage it can offer [13,15]. These capabilities can help SMEs streamline operations, gain valuable insights, and make data-driven decisions to drive growth and innovation. While the adoption of AI in SMEs may currently be limited, SMEs must recognize the potential advantages that AI can bring to their businesses [16]. Overcoming challenges related to resources, awareness, and integration is essential to unlock the full potential of AI and ensure that SMEs remain competitive and resilient in an increasingly AI-driven future [14]. From this point of view, we analyzed whether there are statistically significant differences between SMEs and large enterprises in the measurement of the level of AI usage. Through our analysis, we have identified differences in the adop-

tion of AI between SMEs and large enterprises, leading us to develop innovative solutions that cater specifically to the needs of SMEs while remaining applicable to enterprises of all sizes. By focusing on accessible resources, awareness-building initiatives, and seamless integration, we aim to empower SMEs and enable them to thrive in an AI-driven future.

Furthermore, AI has become a game-changer in various industries, offering unprecedented capabilities to transform business operations and decision-making processes. For instance, production lines have become increasingly adaptable, capable of switching between different operations based on resource availability, a process greatly facilitated by the integration of artificial intelligence. In the agriculture and food industry, AI-enabled machines have become highly popular for their efficiency in segregating and selecting items. Their ability to ensure quick and precise packaging has ushered in a significant transformation in the digital era [17]. In the realm of project management, AI has the potential to revolutionize how projects are planned, executed, and monitored [18]. Thus, this article also investigates the support levels of AI for project management, specifically examining the disparities between SMEs and large enterprises. SMEs and large enterprises operate in distinct contexts, facing unique challenges and opportunities. While large enterprises often have greater resources and established processes, SMEs tend to operate with more limited resources and leaner structures. AI can play a pivotal role in addressing these challenges by providing innovative solutions that optimize project management practices, enhance efficiency, and drive success. This article aims to shed light on the varying levels of AI support for project management between SMEs and large enterprises. By analyzing and comparing the utilization of AI technologies, tools, and methodologies, we can gain insights into how these different types of organizations leverage AI in their project management processes.

This article focuses on the varying levels of AI adoption in project management between SMEs and large enterprises in Slovenia. It highlights significant disparities in AI adoption, usage, and impacts on project management between these two types of enterprises. This study utilizes a comprehensive survey and statistical analysis, including the Mann–Whitney U test, to validate these differences. Key findings demonstrate that large enterprises have higher AI adoption levels than SMEs. This study provides valuable insights for SMEs and large enterprises to enhance AI adoption and leverage its benefits in project management, emphasizing the need for targeted strategies to boost AI integration in SMEs.

AI is transforming the project management landscape, offering new possibilities for improved efficiency, accuracy, and decision-making capabilities [1,4]. Understanding the differences in AI support levels between SMEs and large enterprises is vital for enterprises seeking to leverage AI effectively in their project management processes and increase their competitiveness in a rapidly changing environment. Thus, this article provides valuable insights and recommendations to bridge the gap, enabling enterprises of all sizes to harness the potential of AI and drive project success. Moreover, the results of this article offer valuable insights for both researchers and practitioners in the field of project management. Understanding the differing perceptions and priorities of SMEs and large enterprises regarding AI technologies and their impact on project implementation can inform the development of tailored strategies and solutions to address the specific needs and challenges faced by each type of enterprise. By following these recommendations, SMEs can harness the power of AI technologies to enhance project implementation, improve productivity, competitiveness, streamline processes, and achieve successful project outcomes.

In addressing the emerging paradigm of AI in project management, our study specifically focuses on the underexplored area of AI adoption in SMEs. Despite the acknowledged potential of AI in revolutionizing project management processes, its penetration in SMEs remains limited. This gap is primarily due to challenges such as resource constraints, the lack of AI literacy, and limited access to advanced AI tools and technologies [12]. Our research aims to bridge this gap by providing an in-depth analysis of the current state of AI adoption in SMEs and identifying the barriers that hinder their full engagement with AI technologies. By comparing the adoption rates and strategies of AI in SMEs with

those in larger enterprises, our study offers valuable insights into SMEs' specific needs and challenges in integrating AI into their project management practices. Moreover, we propose actionable strategies tailored to the unique context of SMEs, aiming to facilitate their journey towards embracing AI. In doing so, our study not only sheds light on the current landscape of AI in project management within SMEs but also contributes to the broader discourse on enhancing AI penetration in this vital sector of the economy.

In Section 2, we present the literature review and hypotheses, offering a comprehensive overview of existing research and establishing the theoretical framework for our study. This is followed by a detailed description of the materials and methods in Section 3, where we outline our research approach, including the data collection and analysis techniques, thus laying the groundwork for our empirical investigation. The results obtained from our study are introduced in Section 4. This section is followed by a discussion (Section 5) in which we analyze and interpret the significance of these findings. The article concludes with the conclusions (Section 6), summarizing the main insights of our research.

2. Literature Review

2.1. *Adopting AI Technologies and Using AI Solutions in a Project*

Digitalization has become an essential aspect of modern business for SMEs. To stay competitive and foster future growth, SMEs must actively shape their digital transformation and seize the vast opportunities it presents [19]. However, SMEs must recognize the importance of AI and the opportunities it presents. AI technologies have the potential to revolutionize processes, enhance efficiency, and drive innovation within SMEs [15]. Embracing AI technologies can enable SMEs and large enterprises to streamline operations, drive growth, and create value in an increasingly digitalized and AI-driven business landscape [19].

Adopting AI usually refers to the initial phase where an enterprise incorporates AI into its operations [20]. On the other hand, using AI refers to the practical application of AI technologies in the organization's daily operations. It is about how AI is implemented, integrated into existing systems, and utilized in ongoing processes [21].

According to research conducted by Benjamins (2019) [12] on 54 SMEs in Spain, it was found that approximately 80% of the participants were aware of various AI use cases. However, one of the primary challenges faced by SMEs is the lack of access to the necessary technical skills, such as data engineering, analytics, and machine learning. More than 75% of the SMEs surveyed reported a lack of access to the right knowledge and expertise, which significantly hampers the adoption and implementation of AI technologies. In terms of actual AI usage among SMEs, around 30% confirmed that they are currently utilizing AI in their operations. Additionally, almost 60% expressed plans to incorporate AI in the future, demonstrating a growing interest in leveraging its potential benefits. However, a small percentage, slightly over 10%, stated that they currently have no plans to adopt AI. When asked about the specific problems or challenges that SMEs aim to solve or address through AI applications, several common use cases emerged. These include enhancing sales processes, gaining a deeper understanding of market dynamics, implementing predictive maintenance practices, optimizing machine design, and more. These application areas highlight the diverse ways in which SMEs aim to leverage AI to improve their operational efficiency, gain competitive advantage, and drive business growth. Also, it is crucial for enterprises to prioritize talent management, focusing on attracting and retaining top talent, and leveraging AI and other technological advancements to optimize their human capital strategies. This approach will ensure enterprises remain competitive and capable of achieving their strategic objectives in an increasingly complex business landscape [22]. Studies have demonstrated that SMEs that embrace digital technology empowered by AI can significantly enhance their competitive advantage and productivity [13]. These SMEs strategically invest in AI technologies to gain insights into user behavior, provide personalized recommendations, improve customer decision making, optimize search results, enhance media communication, increase sales, boost organizational performance,

and reduce costs [6,19]. However, the onset of the COVID-19 pandemic has introduced unprecedented risks to economies and business operations worldwide [15]. SMEs have faced challenges such as customer demand disruptions, reduced purchasing activities, and supply chain collapses, making it extremely difficult to find alternative suppliers [15,23]. Given the inherent resource constraints often experienced by SMEs [14], it is not surprising that a significant proportion of SMEs in the UK, approximately 80%, have reported negative revenue impacts and reduced cash flow during the COVID-19 pandemic [15]. In response to these challenges, many enterprises, regardless of their size, have recognized the potential of AI in adapting to and recovering from the pandemic. The implementation of AI into SMEs' operations has the potential to drive recovery and foster long-term success. By harnessing the transformative power of AI, SMEs can navigate the challenges posed by the pandemic and emerge stronger, more efficient, and better equipped to seize new opportunities in a post-COVID world [13,16]. Based on the literature review, two hypotheses were formulated:

Hypothesis H1: *There are statistically significant differences in the adoption of AI technologies in projects between SMEs and large enterprises.*

Hypothesis H2: *There are statistically significant differences in using AI solutions in projects between SMEs and large enterprises.*

2.2. Improving the Work of the Project Leaders with AI

A project leader is responsible for overseeing various timelines and milestones, ensuring that projects stay on track and meet their objectives [24]. A project leader also plays a crucial role in problem solving, proactively identifying and addressing bottlenecks to keep projects running smoothly [25]. Project leaders can employ AI models to predict potential roadblocks, estimate timelines, and foresee resource requirements. By anticipating risks and challenges in advance, leaders can proactively mitigate them, resulting in improved project planning and execution [26]. With AI-powered predictive analytics, leaders gain a strategic advantage, ensuring projects stay on track and align with organizational goals. Project leaders often grapple with repetitive and time-consuming tasks that hinder productivity [27]. AI-enabled automation can alleviate this burden by managing routine processes, freeing up leaders' time for more strategic activities. From automating data entry and report generation to managing workflows and scheduling, AI can enhance efficiency and minimize human error [1,3].

Moreover, integrating AI into project management can significantly vary depending on which of the following methodology is adopted: Waterfall and Agile. The Waterfall model is a linear and sequential approach where project phases follow one after the other in a fixed order. In the context of AI, this methodology can be particularly effective in projects where requirements are well-defined and unlikely to change [28]. AI can enhance the Waterfall model by providing predictive analytics for better planning and risk assessment in the early stages, ensuring that each project phase is more informed and efficient [28,29]. Agile project management, in contrast, is iterative and flexible, emphasizing continuous improvement and adaptability to change. AI in an Agile context can play a crucial role in rapid prototyping, real-time data analysis, and providing insights for quick decision making. It can help Agile teams to adapt to changing requirements more swiftly and accurately, enhancing the dynamic nature of Agile projects [28,30].

By automating mundane tasks, project leaders can focus on critical thinking, problem solving, and fostering team collaboration, thus driving innovation, and fostering growth [4,31]. Effective communication and collaboration are vital for project success. AI-powered chatbots and virtual assistants can facilitate seamless communication between team members, enabling quick information exchange and resolving queries promptly [6]. Natural Language Processing capabilities enable these AI tools to understand and respond to user queries, thereby augmenting team collaboration. AI can support project leaders in

their personal and professional growth by providing access to a wealth of knowledge and expertise. On the other hand, SMEs and large enterprises differ in terms of their size, organizational structure, resources, and overall scale of operations. When it comes to improving the work of project leaders with AI, the differences between SMEs and large enterprises can have an impact on how AI is implemented and utilized [16]. For example, SMEs are typically smaller in size with fewer employees, limited hierarchical levels, and less complex organizational structures. Decision-making processes are often more streamlined and agile. Also, SMEs may have limited access to large volumes of data. This can impact the availability of training data for AI models [32]. Large enterprises, with greater resources, may invest in building customized AI solutions tailored to their specific project management needs. This could involve developing AI-powered project management systems that integrate with existing enterprise software, automate workflows, and provide advanced analytics for better decision making [1,32]. Moreover, the following hypothesis is proposed:

Hypothesis H3: *There are statistically significant differences in improving the work of project leaders between SMEs and large enterprises.*

2.3. Successful Project Implementation Using AI

Successful project implementation is defined as achieving project objectives within time, budget, and quality constraints. This encompasses not only the completion of project deliverables but also the satisfaction of stakeholders, the realization of intended benefits, and the adherence to predefined standards and requirements [33]. Successful project implementation is integral to any enterprise's growth and sustainability. In this era of technological advancement, AI stands out as a pivotal tool in achieving project objectives efficiently and effectively within the constraints of time, budget, and quality [25,26,28]. In summary, successful project implementation using AI requires a strategic, holistic, and collaborative approach, particularly for SMEs. By understanding and navigating the AI landscape, embracing a culture of innovation and collaboration, and focusing on scalable and sustainable solutions, SMEs can leverage AI to enhance their project outcomes, drive competitiveness, and position themselves for growth in an increasingly digital landscape [14,16,27,28].

The landscape of AI is vast and rapidly evolving, with a wide array of tools, algorithms, and approaches available. It can be overwhelming for enterprises to navigate this landscape and identify the best strategies for integrating AI into their business processes [14]. Furthermore, the implementation of AI requires a holistic approach that goes beyond simply adopting the technology itself [5]. Enterprises need to consider several factors such as data readiness, infrastructure capabilities, talent acquisition, and cultural change within the enterprise [26]. Without addressing these aspects, the full potential of AI may not be realized, and the expected business benefits may not materialize. It is also important for enterprises to have a long-term perspective when it comes to AI adoption [34,35]. Another critical factor in achieving successful AI adoption is fostering a culture of collaboration and cross-functional engagement within the enterprise. AI implementation should not be confined to the IT department alone; it requires active involvement and collaboration across various business departments [26]. This includes close collaboration between IT teams, subject matter experts, data scientists, and business leaders to ensure a comprehensive understanding of the organization's needs and the potential AI solutions that can address them [4,7]. According to Abrokwah-Larbi and Awuku-Larbi [16], Ciric Lalic et al. [36], and Dhamija and Bag [17], large enterprises often have substantial financial resources and human capital to invest in AI. This can include hiring a team of AI experts, investing in advanced technology and infrastructure, and dedicating more time and effort to developing, implementing, and refining AI solutions. Also, large enterprises tend to have more strategic planning capabilities, which allows them to incorporate AI into their long-term business strategy, implement AI on a larger scale, and coordinate AI efforts across different business units. Furthermore, it is essential for enterprises to prioritize scalability and

long-term sustainability in their AI projects [4]. Enterprises must plan for the deployment and integration of AI solutions into their existing systems and processes, ensuring that the necessary infrastructure, data management practices, and governance frameworks are in place to support ongoing AI operations. This forward-thinking approach will enable enterprises to maximize the value and impact of AI throughout their enterprise [16,26].

AI and machine learning tools enhance project management and organization by focusing on several key areas. For example, AI can analyze past project data to predict outcomes, identify potential risks, and suggest mitigation strategies [7]. This improves decision making and risk management in project planning. Machine learning algorithms can optimize resource allocation by analyzing project requirements and available resources, leading to a more efficient use of employee labor and materials [1]. AI tools can automate routine tasks, such as scheduling and tracking, freeing up human resources for more complex activities [37]. AI-powered tools can facilitate better communication among team members by providing real-time updates and predictive insights, leading to more coordinated efforts. Machine learning algorithms can tailor solutions based on specific project needs, ensuring a more targeted approach in project management [8,38]. Moreover, in projects with varying work conditions, AI aids in identifying early warning signs of potential accidents during execution. In construction project management, for instance, AI can oversee equipment performance, detect hazardous environments, analyze employees’ facial expressions to foresee their work efficiency, monitor air quality, and warn of potential accidents [37–39]. This application of AI ensures a safer, more efficient project implementation by proactively managing risks. Thus, the following hypothesis is formulated:

Hypothesis H4: *There are statistically significant differences in successful project implementation using AI between SMEs and large enterprises.*

Furthermore, we present Table 1, summarizing key findings from the literature review of our article. Table 1 illuminates the differences in perceptions and applications of AI technologies between SMEs and large enterprises.

Table 1. Differences in perceptions and applications of AI technologies between SMEs and large enterprises: A literature review summary.

Aspect	SMEs	Large Enterprises
Differences in AI Adoption	Lower average agreement with AI adoption compared to large enterprises.	Higher average agreement with AI adoption.
Specific AI Application Areas	High agreement in predictive analytics and Project Scheduling Software. Predictive analytics enable small businesses to make data-driven decisions, which can be more accurate and effective than intuition-based decisions. This is particularly valuable for small businesses that need to maximize the impact of every decision.	The approach to predictive analytics and Project Scheduling Software is often more complex and extensive. For example, large enterprises typically handle massive amounts of data, requiring more robust and powerful predictive analytics systems.
Utilizing AI Technologies in Project Management	There is less agreement in enhancing project leaders’ work with AI, but they recognize AI’s potential. SMEs often have limited resources, both in terms of budget and personnel. Investing in AI technology can be costly, and they may not have the necessary staff with expertise in AI.	Higher agreement in enhancing project leaders’ work with AI. For example, large enterprises have access to vast datasets. AI can process and analyze this data more effectively than traditional methods, leading to more informed decision making. AI allows for more tailored project management solutions that can be adapted to the specific needs and workflows of large companies.

Table 1. Cont.

Aspect	SMEs	Large Enterprises
Successful Project Implementation with AI	Focus on AI's potential to enhance productivity. For example, AI tools can help small businesses identify inefficiencies in their processes and provide solutions to optimize them. This leads to faster, more efficient project completion, which is vital for small enterprises that need to respond quickly to market changes.	Emphasize AI in compliance, security, and risk management. AI can process and analyze extensive data to provide insights that support complex decision-making processes in large companies, particularly in risk assessment and management. Also, AI can integrate data across various systems and departments, providing a holistic view essential for effective compliance, security, and risk management in large enterprises.

Source: [6,12–16,19].

3. Materials and Methods

3.1. Data and Sample

The primary research was conducted to collect data. The survey encompassed a random sample of 473 SMEs and large Slovenian enterprises. Small-sized enterprises are classified according to the following criteria, and they must satisfy at least two of these conditions within a business year: (1) the average number of employees does not exceed 50, (2) the annual net sales revenue is no more than EUR 8 million, and (3) the total asset value is no more than EUR 4 million, as defined in ZGD-1 [40]. Conversely, large enterprises are identified by meeting the subsequent criteria: (1) they employ an average of over 250 personnel within a business year, (2) their net sales revenue surpasses EUR 40 million, and (3) their total asset value exceeds EUR 20 million, as specified in ZGD-1 [40]. The sampling frame was the 2066 SMEs and large enterprises in Slovenia. We selected a random sample of 600 enterprises from the total of 2066. The response rate for this study was 78.8%.

The composition of the sample reflected a distribution where 53.7% of the enterprises were classified as large, while SMEs accounted for 46.3%. The research participants included either owners or managers from each enterprise. This study consisted of 59.8% male respondents and 40.2% female respondents. The participating enterprises represented a wide range of sectors based on the standard classification of enterprise activities. The sectors included manufacturing (27.1%); wholesale and retail trade, and repair of motor vehicles and motorcycles (23.5%); financial and insurance activities (16.5%); information and communication activities (13.3%); real estate activities (9.5%); professional, scientific, and technical activities (6.8%); human health and social work activities (2.3%); and administrative and support service activities (1.0%). The inclusion of enterprises from various sectors ensured a comprehensive representation of different industries and their experiences with AI support in project management. Table 2 presents a demographic overview of the sample.

Table 2. Sample structure.

Type of Enterprise	Total Number	Percentage
SMEs	219	46.3%
Large Enterprises	254	53.7%
Sectors Represented		
Manufacturing	128	27.1%
Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles	111	23.5%
Financial and Insurance Activities	78	16.5%
Information and Communication Activities	63	13.3%

Table 2. Cont.

Type of Enterprise	Total Number	Percentage
Real Estate Activities	45	9.5%
Professional, Scientific, and Technical Activities	32	6.8%
Human Health and Social Work Activities	11	2.3%
Administrative and Support Service Activities	5	1.0%
Gender of Respondents		
Male	283	59.8%
Female	190	40.2%

3.2. Research Instrument

To collect the data, we utilized a closed-type questionnaire as our primary research instrument. The questionnaire was designed to include statements related to specific constructs, and participants were requested to indicate their level of agreement using a 5-point Likert-type scale. The scale ranged from 1, representing “strongly disagree”, to 5, indicating “strongly agree”. Items for the construct “adopting AI technologies in the project” were adopted from Wamba-Taguimdje et al. [1], items for the construct “using AI solutions in a project” were adopted from Niederman [7], items for the construct “successful project implementation” with using AI were adopted from Wijayati et al. [35], and items for the construct “improving the work of the project leaders with AI” were adopted from Podgórska and Pichlak [25].

3.3. Statistical Analysis

Initially, the data analysis process encompassed the utilization of descriptive statistics. These statistical measures were employed to assess the average agreement levels with individual statements related to particular constructs, which are (1) adopting AI technologies in projects, (2) using AI solutions in projects, (3) improving the work of project leaders, and (4) successful project implementation with using AI. To delve further into the analysis, using the Kolmogorov–Smirnov and Shapiro–Wilks tests, we first found that the data sets for the variables within the constructs were not normally distributed; therefore, a non-parametric test known as the Mann–Whitney U test was conducted. This test was specifically chosen to determine statistically significant differences between two distinct groups, namely SMEs and large enterprises. The choice of these two groups aimed to discern the varying levels of AI adoption and implementation in projects, the role of AI in improving leadership, and the success rate of AI-integrated projects based on the organization’s size. The Mann–Whitney U test helped illuminate possible disparities in these aspects between SMEs and large enterprises, providing richer insights into the practical implications and outcomes of AI adoption in project management.

4. Results

In the following, we present descriptive statistics and the results of the Mann–Whitney U test for each construct related to AI in project management in SMEs and large enterprises. Table 3 shows descriptive statistics and the results of the Mann–Whitney Test for the construct “adopting AI technologies in the project”.

Table 3 reveals notable disparities between SMEs and large enterprises in terms of their level of agreement regarding the adoption of AI technologies in project management. Specifically, owners in SMEs exhibit a lower average agreement compared to their counterparts in larger enterprises. Among SMEs, the highest average agreement pertains to the utilization of program and portfolio structures for project management, as well as the incorporation of AI technologies in project work design. Conversely, there is only a partial average agreement among owners of SMEs regarding the use of AI technologies in projects for task planning. Moreover, a low average level of agreement is observed when it comes

to the statement concerning the adoption of AI technologies in projects for team creation. The results of the Mann–Whitney U test indicate the presence of statistically significant differences between SMEs and large enterprises concerning the adoption of AI technologies in project management. However, these differences do not hold for two specific aspects: the utilization of program and portfolio structures for managing projects and the integration of AI technologies in project work design. In all other areas evaluated, significant disparities were observed. These findings suggest that SMEs and large enterprises differ significantly in their adoption of AI technologies for various project management purposes. The results highlight that SMEs may lag behind larger enterprises when it comes to incorporating AI into project-related activities such as task planning and team creation. Based on the results, we accepted Hypothesis H1: There are statistically significant differences in the adoption of AI technologies in projects between SMEs and large enterprises.

Table 3. Descriptive statistics and the results of the Mann–Whitney Test for the construct “adopting AI technologies in the project”.

Adopting AI Technologies in the Project	Mann–Whitney U	Asymp. Sig. (2-Tailed)	SMEs			Large Enterprises		
			Mean	Median	Std. Deviation	Mean	Median	Std. Deviation
Our enterprise uses program and portfolio structures for managing projects.	21,196.500	0.062	3.74	4.00	0.913	3.99	4.00	0.920
Our enterprise has a digital transformation strategy, including AI adoption.	19,567.500	0.002	3.63	4.00	0.963	3.80	4.00	1.034
Our enterprise uses AI technologies in projects for work design	21,066.000	0.054	3.71	4.00	0.957	3.93	4.00	1.015
Our enterprise uses AI technologies in projects to plan new tasks.	20,695.500	0.026	3.48	4.00	0.978	3.70	4.00	1.073
Our enterprise uses AI technologies in projects to create teams.	19,911.500	0.004	3.54	4.00	0.993	3.72	4.00	1.033

Figure 1 shows the mean values of AI adoption in SMEs and large enterprises. This plot provides a visual comparison of how AI technologies are adopted in various aspects of project management and strategy in SMEs versus large enterprises. Each line in the plot presents the mean values for a specific enterprise type across different statements, allowing for a direct comparison between SMEs and large enterprises in their approach to adopting AI technologies. Table 4 presents descriptive statistics and the results of the Mann–Whitney U Test for the construct “using AI solutions in the project”.

Table 4. Descriptive Statistics and the results of the Mann–Whitney Test for the construct “using AI solutions in the project”.

Using AI Solutions in the Project	Mann–Whitney U	Asymp. Sig. (2-Tailed)	SMEs			Large Enterprises		
			Mean	Median	Std. Deviation	Mean	Median	Std. Deviation
We use ChatBots (Digital Assistants) to improve the work on the project.	15,991.000	0.000	3.49	3.00	1.039	4.12	4.00	0.944
We use Predictive Analytics Tools to improve the work on the project.	20,779.000	0.023	3.90	4.00	0.634	4.46	4.00	0.607
We use Robotic Process Automation to improve the work on the project.	21,083.000	0.049	3.72	4.00	0.907	4.05	4.00	0.720
We use Project scheduling software (it helps in planning, tracking, and analysis of projects) to improve the work on the project.	20,972.000	0.039	3.83	4.00	0.836	4.19	4.00	0.715
We use Resource Scheduling software (it helps allocate resources like equipment rooms, staff, and other resources) to improve the work on the project.	21,649.000	0.132	3.76	4.00	0.964	4.08	4.00	0.710

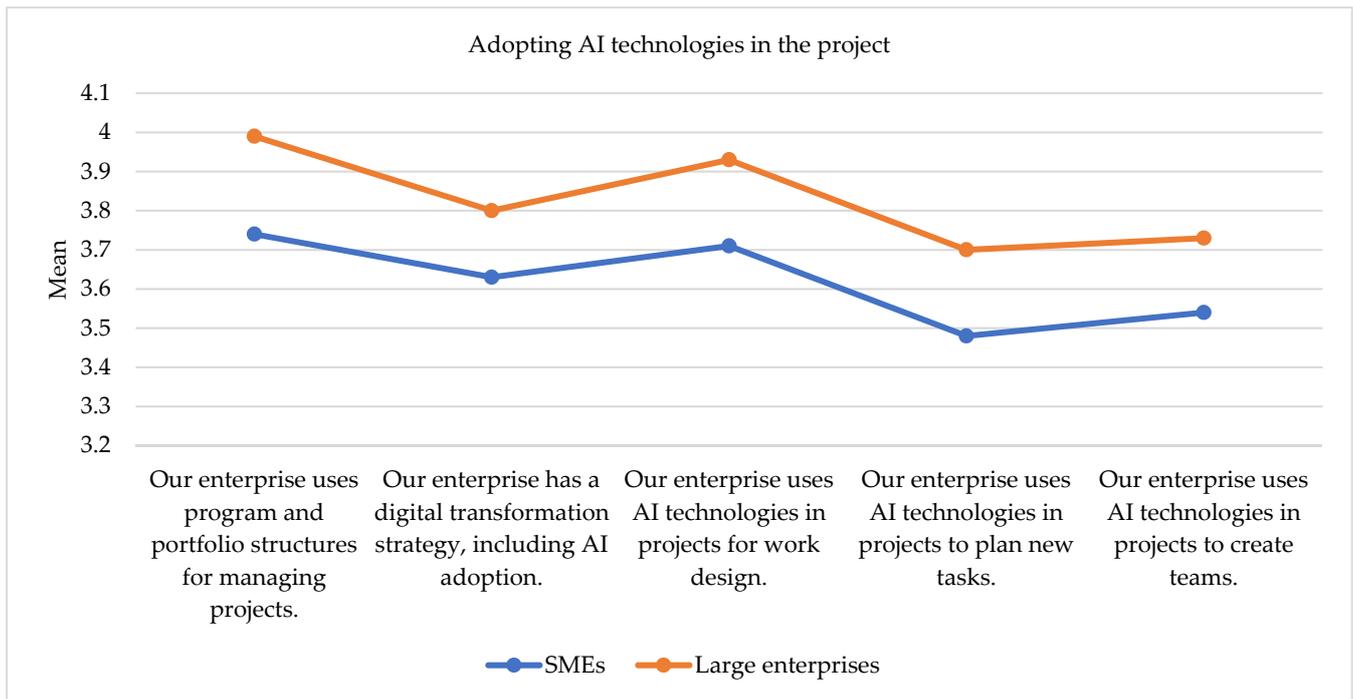


Figure 1. Adopting AI technologies in the project between SMEs and large enterprises.

The results in Table 4 show that, on average, SMEs exhibit lower susceptibility to the implementation of AI solutions in projects. Specifically, the average level of agreement with the statement concerning the usefulness of AI solutions in projects is lower for SMEs compared to large enterprises. Among SMEs and large enterprises, the highest average agreement regarding the usefulness of AI solutions in projects pertains to the utilization of Predictive Analytics Tools to improve the work on projects and to the adoption of Project Scheduling Software, which aids in project planning, tracking, and analysis, thus improving overall project performance. In large enterprises, this is followed by the use of ChatBots (Digital Assistants) to improve the work on projects. On the other hand, on average, SMEs only partially agree that they use ChatBots (Digital Assistants) to improve the work on projects. In particular, the average level of agreement among SMEs regarding the usefulness of AI solutions in projects is lower compared to that of large enterprises. This implies that SMEs are less convinced about the benefits of AI solutions for project management and execution. The results of the Mann–Whitney U test indicate the presence of statistically significant differences across all statements associated with the adopting of AI technologies in projects, except for the statement “We use Resource Scheduling software (it helps allocate resources like equipment rooms, staff, and other resources) to improve the work on the project”. Therefore, we confirmed Hypothesis H2: There are statistically significant differences in using AI solutions in projects between SMEs and large enterprises.

Figure 2 shows the comparison of AI solution usage in SMEs and large enterprises. The x-axis presents statements about the use of AI solutions in project, while the y-axis shows the mean values for SMEs and large enterprises. Each line in the plot presents the mean values for a specific enterprise type across different AI solutions. Following this, Table 5 shows descriptive statistics and the results of the Mann–Whitney U test for the construct “improving the work of the project leaders with AI”.

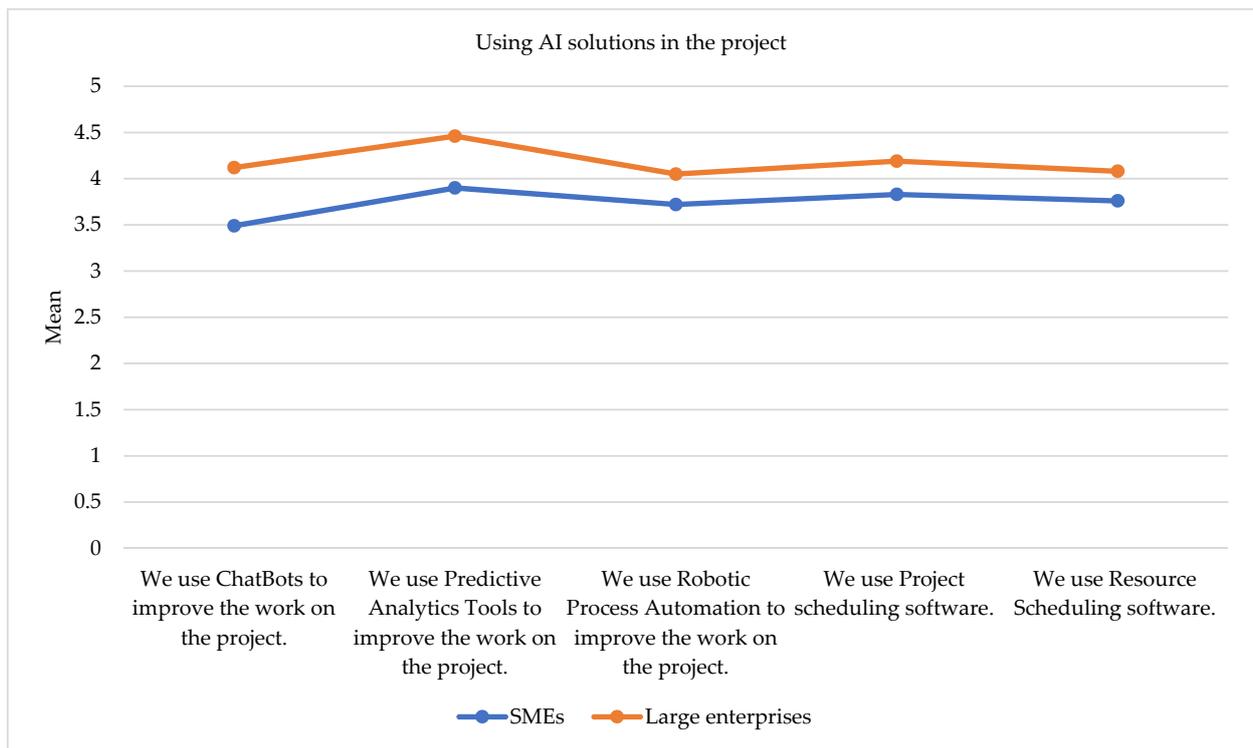


Figure 2. Using AI solutions in the project between SMEs and large enterprises.

Table 5. Descriptive Statistics and the results of the Mann–Whitney U Test for the construct “improving the work of the project leaders with AI”.

Improving the Work of the Project Leaders with AI	Mann–Whitney U	Asymp. Sig. (2-Tailed)	SMEs			Large Enterprises		
			Mean	Median	Std. Deviation	Mean	Median	Std. Deviation
AI allows a leader to work effectively on a project.	16,129.000	0.000	3.71	4.00	0.954	4.24	4.00	0.707
AI allows the leader is released from routine managerial tasks.	17,234.500	0.000	3.65	4.00	1.067	4.17	4.00	0.813
AI allows that a leader can allocate more time to leading the project team.	17,287.000	0.000	3.73	4.00	1.034	4.22	4.00	0.787
AI allows that leaders can focus on complex managerial tasks.	17,482.000	0.000	3.72	4.00	0.942	4.15	4.00	0.785
AI allows that leaders can run more projects.	19,082.500	0.000	3.69	4.00	0.959	4.00	4.00	0.945
AI allows that leaders can work remotely.	18,677.500	0.000	3.61	4.00	0.928	3.95	4.00	0.848

The findings in Table 5 suggest that there is a disparity in the average agreement levels between SMEs and large enterprises regarding statements related to improving the work of project leaders with AI. On average, SMEs exhibit lower agreement compared to large enterprises for these statements. Among the statements, SMEs most strongly agree that AI enables project leaders to allocate more time to leading the project team. This indicates that SMEs recognize the potential of AI to automate certain tasks and free up the leader’s time to focus on team management and guidance. Additionally, SMEs show a high average agreement that AI allows project leaders to focus on complex managerial tasks. This suggests that SMEs acknowledge the capacity of AI solutions to handle routine or repetitive tasks, enabling leaders to dedicate their attention to more strategic and critical aspects of project management. Furthermore, SMEs express a high average agreement that AI enables project leaders to work effectively on projects. This indicates that SMEs

recognize the potential of AI technologies to enhance efficiency and productivity in project-related activities, enabling leaders to perform their roles more effectively. The results of the Mann–Whitney U test show the presence of statistically significant differences across all statements associated with improving the work of the project leaders with AI. Thus, we confirm Hypothesis H3: There are statistically significant differences in improving the work of project leaders between SMEs and large enterprises.

Figure 3 shows the mean values of improving the work of the project leaders with AI between SMEs and large enterprises. Moreover, Table 6 shows descriptive statistics and the results of the Mann–Whitney U test for the construct “successful project implementation using AI”.

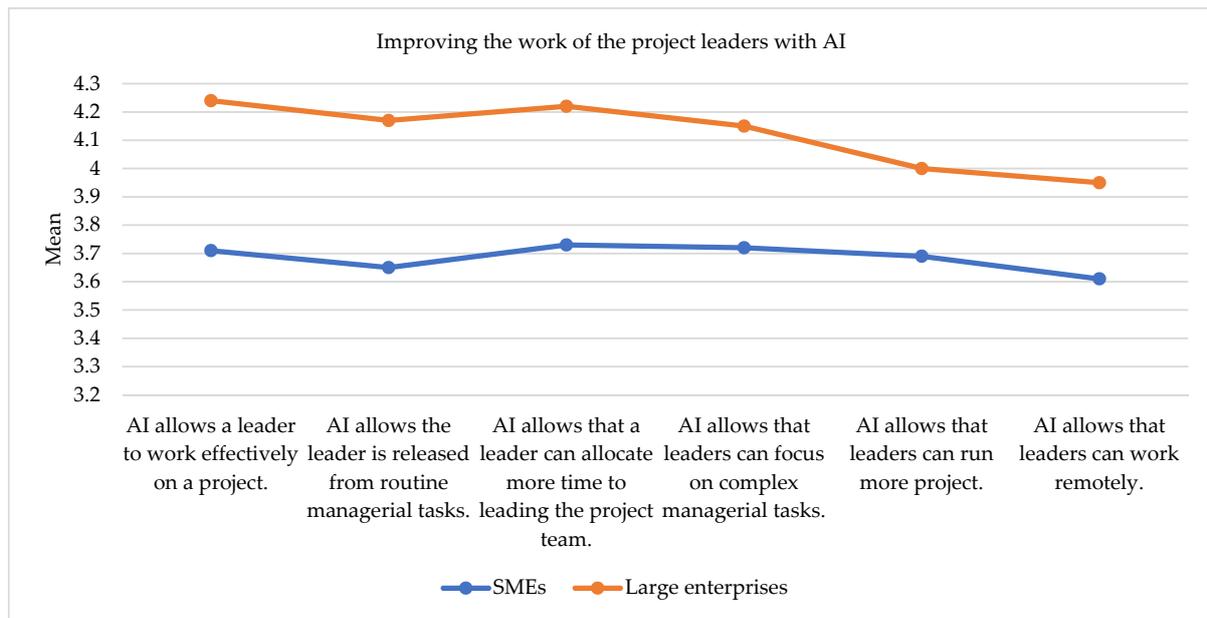


Figure 3. Improving the work of the project leaders with AI between SMEs and large enterprises.

Table 6. Descriptive Statistics and Mann–Whitney Test for the construct “successful project implementation using AI”.

Successful Project Implementation Using AI	Mann–Whitney U	Asymp. Sig. (2-Tailed)	SMEs			Large Enterprise		
			Mean	Median	Std. Deviation	Mean	Median	Std. Deviation
AI technologies improve communication with stakeholders.	18,563.000	0.000	3.66	4.00	0.943	4.03	4.00	0.890
AI technologies improve compliance, security, and project risk management.	17,677.500	0.000	3.58	4.00	1.036	4.06	4.00	0.901
AI technologies improve project performance and reporting.	20,662.000	0.024	3.71	4.00	0.879	3.88	4.00	0.907
AI technologies improve decision-making regarding project work/tasks.	22,328.000	0.353	3.74	4.00	0.871	3.87	4.00	0.876
AI technologies improve the resource utilization.	20,231.000	0.009	3.70	4.00	0.891	3.86	4.00	0.912
AI technologies provide accurate data and information related to project work.	20,377.500	0.013	3.69	4.00	0.880	3.84	4.00	0.894
AI technologies increase productivity by freeing up project managers to focus on more important decisions.	19,787.000	0.003	3.78	4.00	0.944	4.01	4.00	0.964
AI technologies reduce costs and delivery time.	19,855.500	0.004	3.75	4.00	0.893	3.97	4.00	0.886

The results presented in Table 6 indicate that, on average, there is a lower average level of agreement among respondents from SMEs regarding all statements pertaining to successful project implementation using AI. However, among SMEs, the statement with the highest average agreement is related to the positive impact of AI technologies on productivity. Specifically, there is a consensus that AI technologies contribute to increased productivity by allowing project managers to allocate their time and attention to more critical decision-making processes. Additionally, there is an agreement that AI technologies can effectively reduce costs and delivery times, as well as improve decision-making processes concerning project work and tasks. Conversely, among respondents from large enterprises, there is a higher level of agreement, on average, regarding the positive effects of AI technologies. Specifically, there is widespread agreement that AI technologies enhance compliance, security, and project risk management. Furthermore, there is a general consensus that AI technologies improve communication with stakeholders, facilitating more effective interactions and collaborations. Moreover, the results of the Mann–Whitney U test indicate the presence of statistically significant differences across all statements associated with the successful project implementation, except for the statement “AI technologies improve decision-making regarding project work/tasks”. Thus, we confirmed hypothesis H4: There are statistically significant differences in successful project implementation using AI between SMEs and large enterprises.

Figure 4 shows the mean values for various aspects of construct successful project implementation using AI between SMEs and large enterprises.

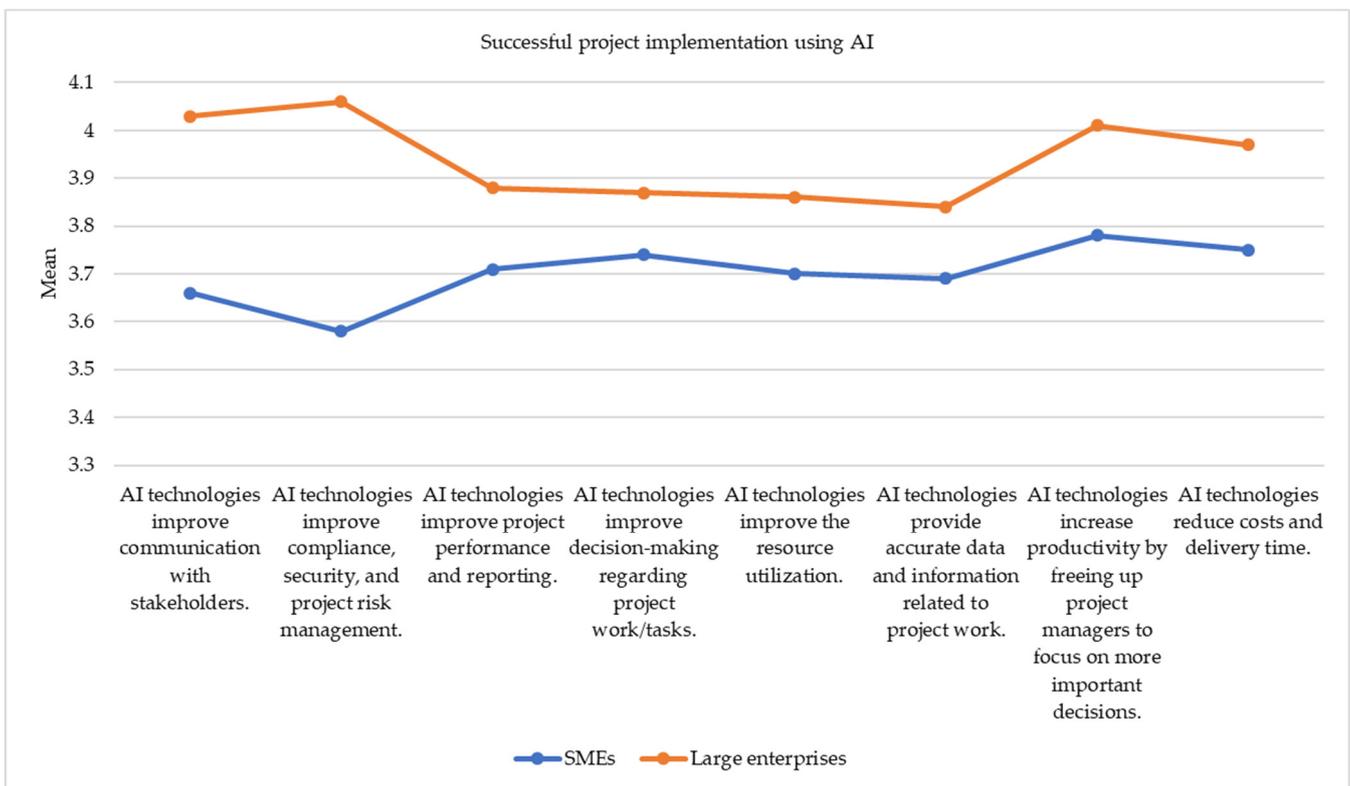


Figure 4. Successful project implementation using AI between SMEs and large enterprises.

At the end of the Results section, we present Table 7 which provides a detailed assessment of the hypotheses we set in the Literature Review section. The following summaries of each hypothesis, based on the gathered data, offer a clear view of our findings.

Table 7. Summary of hypotheses outcomes.

Hypothesis	Description	Outcome
H1	Statistically significant differences in the adoption of AI technologies in projects between SMEs and large enterprises.	Accepted
H2	Statistically significant differences in using AI solutions in projects between SMEs and large enterprises.	Accepted
H3	Statistically significant differences in improving the work of project leaders between SMEs and large enterprises.	Accepted
H4	Statistically significant differences in successful project implementation using AI between SMEs and large enterprises.	Accepted

5. Discussion

AI holds the potential to bring about transformative changes to SMEs in a twofold manner: by reshaping their operating landscapes and facilitating improvements in their business operations. Firstly, AI can dynamically modify the business environment in which SMEs operate. Through the deployment of AI technologies, it can streamline and enhance the business conditions under which these entities function [6,16,19]. This can encompass everything from refining customer interactions and optimizing supply chains to automating repetitive tasks, thus freeing up time and resources for more strategic business activities. With AI serving as a revolutionary tool, SMEs can navigate the challenges of their business environments with more ease and agility [12,35]. Secondly, AI also empowers SMEs to overhaul their existing business models and practices. This transformative capability can enable them to redefine their approach toward critical areas such as product development, marketing strategies, customer service, and data management [14]. In this context, AI serves as a strategic lever that can pivot traditional business methodologies toward more innovative, data-driven, and customer-centric models. These alterations in business models and practices, facilitated by AI, can eventually lead to significant improvements in productivity [15]. By automating routine tasks, improving decision making through data analysis, and delivering personalized customer experiences, AI can enhance the overall efficiency and productivity of enterprises of all sizes [17]. Through predictive analytics and customer behavior analysis, enterprises can identify new markets and customer segments, thereby expanding their customer base and market presence [4]. Thus, the implementation of AI provides enterprises with opportunities to scale up their operations. By automating processes, improving resource allocation, and facilitating data-driven strategies, AI can help enterprises grow and expand, offering a significant competitive edge in today's digital economy [1,11].

The practical application of AI in project management can be illustrated through several key examples. Firstly, AI algorithms enhance resource allocation by predicting project needs and optimally matching staff skills with project requirements [33,41]. Secondly, predictive analytics are employed for risk management, where AI systems analyze data to foresee potential delays or cost overruns, allowing for proactive mitigation strategies [1,3]. Additionally, AI supports decision making by processing vast amounts of project-related data, offering valuable insights for better outcomes. Automated project monitoring is another area where AI proves invaluable, continuously tracking project progress and alerting managers to deviations from planned trajectories [7,9,10]. Finally, AI-driven chatbots have revolutionized project communication, ensuring efficient and effective information flow within teams and with stakeholders [31,36]. These examples underline AI's transformative impact on traditional project management practices, highlighting its potential for future advancements in the field.

5.1. Recommendations

Table 3 shows that there are statistically significant differences in adopting AI technologies in projects between SMEs and large enterprises. On average, SMEs have a lower average agreement with all statements related to adopting AI technologies in projects compared to large enterprises. The disparities observed between SMEs and large enterprises in terms of adopting AI technologies in project management that are statistically significant in three of five variables can be attributed to several factors. These differences can be better understood by examining various aspects such as enterprise size and resources [12,13], organizational structure [6], and strategic priorities [13]. According to Szedlak et al. [11] SMEs typically operate with limited resources, both in terms of finances and human capital, compared to larger enterprises. This resource constraint can hinder their ability to invest in and adopt AI technologies for project management purposes. Large enterprises, on the other hand, often have more extensive budgets and dedicated teams that can facilitate the implementation of AI technologies [16]. Also, the adoption of AI technologies requires a certain level of investment in infrastructure, software, and skilled personnel. SMEs might struggle to allocate sufficient resources to acquire and maintain the necessary AI tools and talent, making it more challenging for them to incorporate AI into project management practices [15,16,34]. Large enterprises, with their greater financial capabilities and access to specialized resources, may find it relatively easier to adopt and integrate AI technologies into their projects. Moreover, the structure and complexity of organizational hierarchies can influence the adoption of AI technologies [31,34]. On the other hand, large enterprises, with their greater resources and market presence, may prioritize digital transformation and innovation as key strategic initiatives. This focus on leveraging AI technologies for competitive advantage can drive their higher adoption rates. SMEs, on the other hand, may have different strategic priorities such as cost optimization or market penetration, which might not prioritize the adoption of AI technologies to the same extent [13,19]. Adopting AI technologies can be challenging for SMEs due to constraints such as limited resources, lack of expertise, and time [16,17]. However, it is definitely possible to effectively implement AI technologies within these constraints. Here are some recommendations for adopting AI technologies in SMEs projects: (1) The first step for any enterprise looking to adopt AI technologies is understanding the potential applications and implications of AI in their business. This requires an investment in education and training to ensure that all levels of the organization are knowledgeable about AI, from senior management to the employees. (2) SMEs should define clear, achievable goals that AI can help to meet. This could be anything from improving customer service with AI chatbots to enhancing supply chain management with predictive analytics or optimizing business processes. (3) SMEs should aim to start small, with pilot projects focused on specific tasks or processes. This allows the enterprise to learn, iterate, and improve its use of AI in a manageable way. (4) To implement AI successfully, SMEs must ensure that they have a robust data management strategy in place. Data is the backbone of AI, so organizations need to ensure they are collecting relevant data that it is well-organized, and that they are following all appropriate privacy regulations. (5) SMEs should consider open source software. There are numerous open source AI tools available, many of which are highly sophisticated and freely accessible. These tools can reduce costs and enable SMEs to customize their AI solutions according to their needs. (6) After the implementation of any AI project, SMEs should continuously review and measure the success and ROI of the AI technology. This will help them identify areas of improvement, ensure that the AI is delivering the expected results, and refine their strategies based on actual data.

The results in Table 4 show that there are statistically significant differences in using AI solutions in projects between SMEs and large enterprises in four of five variables. Based on the results presented in Table 4, it is evident that SMEs show on average, a lower inclination towards implementing AI solutions in their projects compared to large enterprises. However, there are specific areas where SMEs demonstrate high agreement regarding the usefulness of AI solutions. These areas include the utilization of Predictive

Analytics Tools and the adoption of Project Scheduling Software. While SMEs, on average, demonstrate a lower inclination towards implementing AI solutions compared to large enterprises, the higher agreement in the specific areas of Predictive Analytics Tools and Project Scheduling Software indicates that SMEs recognize the potential value of these AI solutions. These findings suggest that SMEs are selectively adopting AI technologies that offer direct benefits and address their project-specific needs. To capitalize on these findings and improve project outcomes, SMEs can consider the following recommendations: (1) Although SMEs only show partial agreement regarding the use of ChatBots (Digital Assistants) to enhance project work, it is still worth considering their implementation. ChatBots can assist in automating repetitive tasks, providing instant support and information to project teams and enhancing communication and collaboration within the project environment. (2) SMEs should start by educating key stakeholders within the organization about the potential benefits of AI solutions in project management. They should organize workshops, training sessions, or webinars to familiarize employees with AI technologies and their applications in different project scenarios. Highlight real-world examples and success stories of SMEs that have implemented AI solutions effectively. (3) SMEs should conduct a thorough analysis of their projects to identify areas where AI solutions can make a significant impact. They should consider the pain points, challenges, and bottlenecks that could be addressed through the implementation of AI technologies. For example, if their projects involve complex data analysis or require predictive insights, they should focus on AI tools related to data analytics and predictive modeling. (4) Begin by implementing AI solutions in small-scale or pilot projects to gain practical experience and assess their effectiveness. This approach allows SMEs to test different AI technologies in real-world scenarios, measure their impact, and gather feedback from project teams. Pilot projects also help build confidence and demonstrate the value of AI solutions to decision makers and stakeholders. (5) Create an environment that encourages innovation and experimentation with AI technologies. Encourage employees to explore new ideas, propose AI solutions, and collaborate on projects that involve AI implementation. Foster cross-functional teams that can combine domain expertise with AI knowledge to drive innovation in project management. (6) SMEs can benefit from partnering with AI experts, consultants, or specialized service providers to accelerate the adoption of AI solutions in projects. These partners can provide guidance, assist in technology selection, and support the integration of AI tools into existing project management processes. Collaborating with external experts also helps SMEs stay updated with the latest AI advancements and best practices. (7) SMEs should establish key performance indicators to measure the impact of AI solutions on project performance. They should track relevant metrics such as improved efficiency, cost savings, reduced errors, and enhanced decision making, and share success stories and achievements within the enterprise to build momentum and generate enthusiasm for further AI adoption.

The findings presented in Table 5 indicate a notable discrepancy in the average levels of agreement between SMEs and large enterprises concerning statements related to enhancing the work of project leaders using AI. On average, SMEs demonstrate, on average, a lower agreement compared to large enterprises. But SMEs exhibit the strongest agreement in recognizing that AI empowers project leaders to allocate more time for effectively leading the project team. This highlights SMEs' acknowledgement of AI's potential to automate certain tasks and liberate leaders' time for team management and guidance. In summary, the data suggest that SMEs hold lower average agreement levels compared to large enterprises when it comes to leveraging AI for enhancing project leaders' work. However, SMEs still acknowledge the potential benefits of AI in terms of time allocation, focus on complex tasks, and overall effectiveness in project management. In conclusion, AI can play a vital role in enhancing project leadership by automating routine tasks, providing valuable insights, and enabling smarter decision making. However, SMEs should also consider the ethical and privacy implications of AI, and they should ensure that their use of AI is aligned with applicable regulations and best practices. SMEs may also need to invest in training to ensure that their leaders are able to effectively use AI tools. Certainly, SMEs can signifi-

cantly improve the effectiveness of project leadership using AI. Here are recommendations for improving the work of the project leaders with AI in SMEs: (1) Project Scheduling: AI can help leaders to create smarter schedules and timelines. AI-based project management software can provide predictive analytics to help leaders foresee potential schedule or budget issues based on historical data. This enables leaders to adjust their plans proactively, reducing risks and minimizing the waste of resources. (2) Task Delegation: AI algorithms can help project leaders with task delegation. AI can analyze the skills, past performance, and workload of each team member to recommend who would be best suited for each task, optimizing team efficiency. (3) Risk Management: Machine learning algorithms can be used to analyze past projects to identify potential risks and how they were mitigated. This helps leaders in risk prediction and mitigation strategies, enabling them to better anticipate project challenges and develop suitable contingency plans. (4) Performance Tracking: AI can help leaders to better track project performance. Advanced AI tools can automate the process of gathering and analyzing data on project progress, saving leaders considerable time and effort. This enables leaders to quickly identify any issues or bottlenecks and to make data-driven decisions. (5) Communication and Collaboration: AI can enhance communication and collaboration among team members. AI-powered chatbots, for instance, can be used to schedule meetings, facilitate communications, and follow up on tasks. They can also provide instant access to important project information, thus improving transparency and engagement within the team. (6) Training and Development: AI can also aid leaders in identifying the training needs of their team members. By analyzing performance data and identifying gaps in skills or knowledge, AI can help leaders to implement targeted training programs to upskill their teams as needed. (7) Stakeholder engagement: AI can analyze communication data to provide insights into stakeholder sentiments and needs, helping project leaders improve their stakeholder management strategies. This can enhance the satisfaction of project stakeholders and increase the chances of project success.

The findings presented in Table 6 provide valuable insights into the level of agreement among respondents from SMEs and large enterprises regarding statements related to successful project implementation using AI. On average, the results indicate a lower level of agreement among respondents from SMEs compared to those from large enterprises. Interestingly, there is no statistically significant difference that AI technologies improve decision making regarding project work/tasks between SMEs and large enterprises. This finding suggests a consensus among respondents that AI technologies have the potential to enhance productivity by enabling project managers to allocate their time and attention to more critical decision-making processes. Additionally, there is agreement within SMEs that AI technologies can effectively reduce costs and delivery time, as well as improve decision-making processes concerning project work and tasks. This alignment in viewpoints highlights the perceived benefits of AI technologies in driving efficiency and effectiveness within project management practices among SMEs. In contrast, respondents from large enterprises demonstrated a higher level of agreement, on average, regarding the positive effects of AI technologies. Specifically, there is widespread agreement among these respondents that AI technologies contribute to improving compliance, security, and project risk management. Furthermore, there is a general consensus that AI technologies enhance communication with stakeholders, thereby facilitating more effective interactions and collaborations. These findings suggest that large enterprises recognize the potential of AI technologies in addressing critical aspects of project implementation, such as risk management and stakeholder engagement. In conclusion, this study sheds light on the varying perspectives of SMEs and large enterprises regarding the successful implementation of projects with the support of AI technologies. While SMEs place greater emphasis on potential productivity gains, large enterprises recognize the broader benefits in terms of compliance, security, risk management, and stakeholder communication. The findings emphasize the need for tailored approaches in leveraging AI technologies to enhance project implementation strategies, depending on the size and specific requirements of the enterprise. Below, we provide recommendations on how SMEs can enhance the success rate

of project implementation by utilizing AI: (1) SMEs should explore various AI solutions and technologies that align with the project's objectives. They should consider AI tools for project management, data analysis, decision support, and task automation, and choose solutions that integrate well with existing systems and workflows, ensuring seamless adoption and compatibility. (2) SMEs may lack in-house AI expertise, so it is crucial to invest in building or acquiring the necessary skills. Thus, SMEs should hire or collaborate with AI specialists or consultants who can guide the enterprise through the implementation process, offer training to team members, and provide ongoing support for AI integration. (3) SMEs should facilitate collaboration between project managers, team members, and AI specialists. SMEs should encourage knowledge sharing, the exchange of ideas, and collaborative problem solving. By leveraging the expertise of different stakeholders, SMEs can effectively integrate AI technologies into project workflows. (4) Successful AI implementation is an iterative process. SMEs should encourage a learning mindset within their organization and continuously seek feedback from project teams and stakeholders. They should also adapt and iterate AI strategies based on lessons learned, emerging challenges, and changing project requirements.

Recommendations for actionable strategies tailored to the unique context of SMEs are as follows: Companies should begin by implementing AI in small, manageable areas where it can have an immediate impact. This could be automating routine tasks, improving customer service with chatbots, or enhancing decision making with data analytics. Also, companies should opt for AI technologies that are scalable and can grow with their business. Moreover, companies should invest in training and development for their team to understand and work effectively with AI. For example, SMEs should collaborate with AI consultants or service providers who have experience with SMEs. They can provide valuable insights into the most effective strategies and help avoid common pitfalls. Companies should establish clear metrics to measure the impact of AI on their business. Additionally, SMEs should encourage a culture that embraces change and innovation.

By following these recommendations, SMEs can increase the adoption and effective utilization of AI solutions in their projects. Embracing AI technologies has the potential to enhance project outcomes, drive competitiveness, and position SMEs for growth in an increasingly digital landscape. According to Abrokwah-Larbi and Awuku-Larbi [16], Klein and Todesco [14], Dhamija and Bag [17], Szedlak et al. [11], and Wamba-Taguimdje et al. [1], AI, with its multifaceted benefits, can be a game-changer for SMEs. By reshaping business environments and enabling SMEs to revamp their business models and practices, AI can drive increased productivity, extend outreach, and facilitate scalability, thereby propelling SMEs towards a future marked by innovation and growth.

5.2. Limitations and Further Research

A limitation of our research is reflected in the sample. This study focused on SMEs and large enterprises in Slovenia. To enhance the understanding of AI adoption in project management, future research could conduct a comparative analysis across different industries, countries, or regions. This would provide insights into contextual factors that influence AI support levels and help identify industry-specific challenges and opportunities. While this study examined multiple dimensions of AI support in project management, there may be other important factors not considered in the analysis. Future research could investigate additional dimensions, such as the impact of AI on project outcomes or the role of organizational culture in AI adoption. Supplementing quantitative findings with qualitative research methods, such as interviews or focus groups, would allow for a deeper exploration of the barriers and challenges faced by SMEs in adopting AI technologies. Also, future research should aim to develop more specific and targeted questions that delve deeper into the diverse ways AI is integrated into different business processes. This approach will better capture the varied and complex nature of AI applications, allowing us to assess and understand the substantial differences in AI adoption and impact across various industries and business functions more accurately.

Moreover, given the rapid evolution of AI and project management methodologies, future research should explore in depth how different frameworks affect AI implementation in project management. This includes examining the role of project leaders in these varying contexts and how AI can support their work in both Waterfall and Agile environments. Also, in our upcoming study, we aim to delve into the industry-specific adoption and implementation of AI in project management. Recognizing the complexity and diversity of different industries, this research will focus on how various sectors uniquely approach AI integration. Our objective is to provide a detailed, comparative analysis across industries, identifying trends, challenges, and opportunities specific to each. This investigation will extend the findings of our current study, offering a comprehensive view of AI's role in project management across the business spectrum.

6. Conclusions

In this concluding chapter, we summarize the core findings of our research and discuss their significance in the context of AI application for project management in enterprises. We aimed to analyze the differences in AI usage between SMEs and large enterprises and identify key challenges and opportunities presented by AI technology. The following points concisely present the main findings of our study:

1. AI integration in enterprises: AI has become a transformative force in enterprises, enhancing efficiency and driving innovation. Its integration in operations and strategies has been pivotal across sectors.
2. Challenges and opportunities for SMEs: While AI adoption shows promise, its uptake in SMEs is limited. Addressing these challenges is crucial for SMEs to remain competitive in an AI-driven future.
3. AI in project management: AI significantly influences project management, offering tools for better planning and execution. This impact varies between SMEs and large enterprises, each facing unique challenges and opportunities in leveraging AI.
4. Empowering SMEs with AI: This study underscores the need for solutions that cater to SMEs, focusing on accessible resources and awareness-building to enable their success in an increasingly AI-centric business landscape.

6.1. The Theoretical Implications of Our Study

This study contributes to the body of knowledge on AI in project management by highlighting the differential adoption and utilization of AI technologies in SMEs compared to large enterprises. It provides insights into the barriers and challenges faced by SMEs in AI adoption, enhancing the understanding of AI's penetration in various business sizes. Also, it sheds light on the disparate approaches and challenges in AI adoption between SMEs and larger enterprises, thereby adding a new dimension to the understanding of technological integration in varied business contexts.

6.2. The Practical Implications of Our Study

The research offers practical guidance for both SMEs and large enterprises on maximizing AI benefits in project management. Also, this study offers valuable, actionable insights for businesses of different sizes, particularly focusing on how SMEs and large enterprises can strategically adopt AI in project management to enhance efficiency and effectiveness. It serves as a decision-making guide for SMEs and larger firms, showcasing how AI can be strategically integrated into project management processes.

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