

THE IMPACT OF ARTIFICIAL INTELLIGENCE ON THE PERFORMANCE OF SMALL AND MEDIUM ENTERPRISES IN KOSOVO

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Abstract: This study investigates the impact of Artificial Intelligence (AI) adoption on the performance of small and medium-sized enterprises (SMEs) in Kosovo, a context where firms face resource constraints but play a pivotal role in economic resilience. Using survey data from 210 SMEs and applying correlation and multiple regression analyses, the research explores how AI integration affects internal management processes, strategic adaptability, and overall organizational outcomes. The objectives were to assess the extent to which AI influences human resource management (HRM), decision-making quality, and customer experience, and to identify enabling factors such as digital readiness and employee training. The findings reveal a strong positive relationship between AI adoption and internal performance indicators, particularly HRM efficiency, where AI training emerged as the strongest predictor of improved outcomes. Decision-making quality was also positively associated with AI, albeit more modestly. However, results indicate a negative relationship between AI usage and customer experience, suggesting that current deployments prioritize internal efficiency at the expense of personalized service delivery. The study concludes that while AI can act as a catalyst for productivity and innovation, its benefits in customer-facing functions remain underutilized. These insights highlight the importance of aligning technological investment with workforce upskilling and customer-centric strategies. The paper contributes to the broader discourse on digital transformation in developing economies by offering recommendations for SME leaders and policymakers to foster inclusive and sustainable AI-driven growth.

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1. Introduction

In recent years, the rapid evolution of Artificial Intelligence (AI) has begun to profoundly reshape the contours of global economic activity, ushering in what many scholars refer to as the Fourth Industrial Revolution (Schwab, 2016). No longer confined to the domains of large multinational corporations or research laboratories, AI has permeated into the mainstream of organizational life, becoming a critical enabler of strategic agility, operational efficiency, and innovation capacity across sectors and geographies. From machine learning algorithms and natural language processing (NLP) to real-time data analytics and autonomous decision-making systems, the landscape of enterprise technology is increasingly defined by AI-driven tools that augment human judgment, optimize workflows, and unlock new pathways to value creation (Russell & Norvig, 2020; Łapińska et al., 2021).

This technological transformation is not limited to large enterprises with sophisticated digital infrastructures; rather, it presents a compelling opportunity for small and medium-sized enterprises (SME's) that, despite their size, constitute the economic backbone of many nations. In the specific context of Kosovo, SMEs play a particularly vital role. According to the Kosovo Agency of Statistics (KAS, 2021), SMEs account for over 99% of all registered enterprises, contributing significantly to employment, innovation, and gross domestic product (GDP). Their contribution to economic resilience and social stability is widely recognized, particularly in transition and post-conflict economies.

However, while the potential benefits of AI adoption in SMEs are substantial, so too are the barriers. Kosovar SMEs often contend with resource constraints, limited access to skilled personnel, and insufficient digital infrastructure, factors that collectively hinder their ability to fully capitalize on the advantages of intelligent technologies (KCC, 2019). Moreover, there exists a knowledge gap in terms of understanding not only how AI can be technically deployed, but also how it can be strategically aligned with broader organizational goals to drive sustainable growth. García-Murillo and Annabi (2023) highlight that enterprises integrating AI into their operations witness substantial improvements in productivity, decision-making speed, and customer service, often resulting in enhanced competitiveness on the global stage. Nevertheless, as these authors also note, the depth and breadth of AI

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integration within SMEs, particularly in less digitally mature economies like Kosovo, remain insufficiently explored in empirical literature. Other scholars, such as Janiesch et al. (2021), argue that while AI offers unprecedented opportunities for business transformation, its effective use is contingent upon both technological readiness and organizational adaptability, a dual challenge for resource-constrained firms.

In response to this under-examined area, the present study seeks to provide an in-depth empirical investigation into the level of AI adoption among 210 SMEs in Kosovo, with a particular emphasis on its impact on organizational performance. The research examines how AI technologies are integrated into internal management practices, influence firms' capacity to adapt to change, and support the development of strategic resilience in volatile market conditions.

The study employs both quantitative and comparative methodologies to uncover patterns of AI usage, distinguishing between early adopters, laggards, and non-users. It also seeks to identify the key enablers and inhibitors of AI adoption in this specific economic and institutional context. Insights drawn from this investigation are expected to contribute not only to the academic literature on AI and SME development in emerging markets but also to provide actionable recommendations for policymakers and business leaders. In particular, the findings will be of practical value to enterprise managers navigating digitally constrained environments, where strategic technology adoption must be carefully balanced against financial and infrastructural limitations. Similar to the dynamic interplay highlighted in recent research on AI's role in industrial productivity, where trade openness, AI capital stock, and research intensity have been shown to shape productivity outcomes, this study also underscores the need to contextualize AI adoption within a broader framework of enabling factors (Luo et al., 2024).

Ultimately, this research aims to bridge the conceptual and empirical gap regarding AI utilization in SMEs operating in under-resourced contexts, offering a nuanced understanding of how digital technologies can be harnessed not simply for survival but for long-term competitive advantage. By illuminating the intersection between technological innovation and strategic management within Kosovo's SME sector, this study aspires to foster a more inclusive digital transformation discourse, one that recognizes the unique challenges and latent strengths of small firms in emerging economies.

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2. Literature review

Artificial Intelligence (AI) has evolved from a conceptual frontier to a pivotal driver of transformation across business sectors. Its integration into enterprise functions is not only accelerating operational efficiency but also redefining the strategic landscape of organizational management. This digital transformation mirrors developments in adjacent technologies such as social networks, which, like AI, have reshaped traditional enterprise functions, including recruitment, knowledge sharing, and information processing by enabling faster, data-driven decision making and reducing operational costs (Dragusha & Prenaj, 2021)

Numerous studies have emphasized AI's potential to enhance innovation and streamline processes. Hosan et al. (2021) observed that companies integrating AI into core operations experience substantial improvements in efficiency and innovation output. AI enables automation of routine tasks, predictive maintenance, and intelligent workflow management, freeing human capital for strategic functions. In alignment with these findings, Huo et al. (2019) demonstrated that AI can be effectively applied to regulate digital market quality through ecological network analysis and algorithmic optimization techniques such as mutation algorithms and ant colony optimization, improving the reliability of online business environments. In alignment with this, Hodinka et al. (2014) emphasize the strategic advantage of integrating Business Intelligence frameworks, such as XBRL, which enable near real-time, targeted, and effective data processing, fundamentally supporting AI's potential to transform business operations. In support of these findings, Haddad (2021) empirically demonstrated that AI technologies significantly improve the excellence of Accounting Information Systems (AIS) in Jordanian banks, enhancing collaboration, information linkage, and the interpretation of business data. Brynjolfsson and McAfee (2017) highlight that AI allows for superior resource allocation, enabling organizations to unlock new sources of value creation, which were previously inconceivable with traditional decision-making models. These changes redefine the boundaries of productivity and innovation.

In the context of small and medium-sized enterprises (SMEs), Lu et al. (2022) show that AI facilitates performance enhancement by optimizing business processes, personalizing customer interactions, and improving decision accuracy. These capabilities are especially critical for SMEs operating in resource-constrained environments, allowing them to compete more effectively against larger firms. Similarly, Bughin et al. (2018) found that AI-driven companies report significantly higher profitability than those lagging in AI adoption, due to data-driven innovation cycles.

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The integration of AI into business strategies involves a paradigm shift in how firms operate and compete. Building on strategic models that link sustainability and innovation, Aqmal et al. (2025) introduced the Green Blue Ocean Strategy (GBOS), which positions AI and IoT (Internet of Things) as mediators in promoting frugal innovation under resource-constrained conditions. Their model, grounded in the Resource-Based View (RBV), emphasizes cost efficiency and environmental sustainability, offering an advanced lens for understanding AI's role in SME innovation. According to Davenport et al. (2019), AI adoption encourages firms to restructure operational models, redefine value chains, and build adaptive strategies based on real-time data and machine intelligence. These shifts mark a transition from reactive to proactive and predictive enterprise management. Bag et al. (2022) reinforce this by noting that AI contributes to reducing operational costs, improving product and service quality, and enhancing customer satisfaction, all key elements of sustainable competitive advantage.

McKinsey & Company (2023) describes that AI is reshaping the very "anatomy of work", with implications for both workforce structure and individual roles. Employees are increasingly supported by intelligent systems that automate repetitive tasks and augment decision-making, thereby enabling higher levels of productivity and engagement. Acemoglu and Restrepo (2018) point out that such human AI collaboration could lead to job transformation rather than job loss, assuming adequate investment in skills and organizational change.

Successful AI adoption is as much about people as it is about technology. According to Bianchi et al. (2020), enterprises face implementation hurdles such as skills shortages, limited digital infrastructure, and financial constraints. Overcoming these requires not only supportive public policy but also a strong internal commitment to upskilling and organizational learning. Westerman et al. (2011) found that digital maturity correlates strongly with leadership engagement, agile structures, and a culture that embraces experimentation.

AI adoption also triggers a need for transformation in organizational culture and human resource management. As Marr (2018) and Eden (2007) note, AI is no longer speculative; it is an operational reality that requires cultural alignment, including openness to innovation, digital literacy, and collaborative work environments. Grover et al. (2020) argue that AI implementation without cultural and behavioral alignment risks underutilization and organizational resistance.

To build trust in AI systems, Shrestha et al. (2019) stress the importance of transparent, explainable algorithms, particularly in areas like hiring, performance appraisal, and customer interaction. These concerns are especially pronounced in

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SMEs where organizational resources and resilience to failed tech implementations are limited.

AI's impact spans across various business functions, profoundly influencing the way organizations operate and compete. In the field of human resources, AI tools are increasingly utilized for automated recruitment, enabling more efficient candidate screening, alongside employee sentiment analysis, which captures workforce attitudes in real time, and training personalization, which adapts learning content to individual employee needs (Marler & Boudreau, 2017). Recent empirical research has also demonstrated that contextual factors such as technological readiness, organizational capacity, and environmental support play a critical role in the effective application of AI in recruitment processes, particularly in industry specific settings like Iran's furniture sector (Bazrkar et al., 2024) In customer service, technologies such as AI powered chatbots and recommendation engines play a pivotal role in enhancing customer satisfaction and loyalty, by delivering faster, more personalized interactions (Grewal et al., 2020). Within supply chain management, AI contributes through predictive analytics and intelligent inventory systems, increasing firms' resilience and responsiveness to market fluctuations and operational risks (Choi et al., 2018).

For SMEs in emerging economies, the integration of such digital tools represents more than just a means to increase efficiency. As Tarute and Gatautis (2014) emphasize, it offers an opportunity to leapfrog traditional legacy systems, positioning AI as a catalyst for strategic transformation, enabling smaller firms to overcome structural limitations and compete on a more level technological playing field.

To provide a clearer synthesis of prior empirical findings and to highlight the gap this study addresses, Table 1 summarizes key research on AI adoption and SME performance across different contexts.

Table 1. Empirical Evidence on AI Adoption and SME Performance

Author(s), Year	Context / Country	Focus of Study	Methodology	Key Findings	Identified Research Gap
Bughin et al. (2018)	Global	AI impact on productivity and profitability	Quantitative (McKinsey report)	AI adoption linked to higher profitability; early adopters show the strongest gains.	Limited SME-specific focus; mostly large firms

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Author(s), Year	Context / Country	Focus of Study	Methodology	Key Findings	Identified Research Gap
Brynjolfsson & McAfee (2017)	USA	AI and business transformation	Conceptual & case-based	AI enhances decision-making and resource allocation	Lack of evidence from developing economies
García-Murillo & Annabi (2023)	SMEs in Europe	AI adoption and firm performance	Empirical survey	AI adoption improves productivity, decision-making speed, and competitiveness.	Focused on digitally advanced economies, not transition economies
Lu et al. (2022)	Global SMEs (post-COVID)	AI challenges and opportunities	Literature review	AI optimizes processes and customer engagement	No empirical testing in under-resourced SMEs
Bianchi et al. (2020)	Italy (SMEs in the tech sector)	Digital maturity and performance	Survey & regression	Workforce digital skills drive AI success	Limited generalizability beyond the IT sector
Bazrkar et al. (2024)	Iran (Furniture SMEs)	AI in recruitment	Empirical survey	AI improves recruitment efficiency when contextual factors align	Narrow sector focus; lacks broader performance outcomes
Choi et al. (2018)	Global supply chains	AI in operations	Quantitative & modeling	AI strengthens supply chain resilience	Does not address SME constraints
Tarutė & Gatautis (2014)	Lithuania (SMEs)	ICT and SME performance	Survey analysis	ICT adoption positively affects the competitiveness of SMEs	Pre-AI era, limited insights into AI-specific adoption
Haddad (2021)	Jordan (banks)	AI in Accounting Information Systems	Empirical survey	AI improves information quality and decision-making in financial institutions.	Focus on banks; limited transferability to SMEs
Łapińska et al. (2021)	Poland (energy & chemical sectors)	Employee trust in AI	Survey	Employee trust in AI improves acceptance and performance outcomes	Sector-specific; not focused on SMEs

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Author(s), Year	Context / Country	Focus of Study	Methodology	Key Findings	Identified Research Gap
Aqmala et al. (2025)	Indonesia (resource-constrained SMEs)	AI and IoT in frugal innovation	Conceptual & empirical model	AI and IoT support sustainable innovation under constraints	Contextual to Asia; limited evidence from European transition economies

Source: Authors' View

As shown in Table 1, while numerous studies confirm the positive effects of AI on efficiency, decision making, and innovation, most focus on large firms or SMEs in advanced economies. Very limited empirical research has examined SMEs in developing or post-transition economies such as Kosovo, leaving an important gap that this study seeks to fill.

Enterprises that embrace AI holistically, embedding it into organizational strategy, workforce development, and digital infrastructure, are better equipped to face disruption. According to Kaplan and Haenlein (2019), AI-ready companies leverage machine learning not just for process optimization but for continuous strategic adaptation. This makes AI not just a technological asset, but a core strategic capability.

The literature converges on the understanding that AI, when integrated thoughtfully, can act as a catalyst for organizational growth, innovation, and resilience. For SMEs, the technology offers immense promise, but this potential can only be fully realized through adequate investment in people, culture, and leadership. Future research should explore how SMEs can overcome structural limitations and design agile strategies to deploy AI ethically and effectively.

Building on the theoretical grounding in the Technology Organization-Environment (TOE) framework (Eveland & Tornatzky, 1990) and Dynamic Capabilities Theory (Teece, 2007), this study formulates the following research questions and hypotheses to empirically examine the role of AI adoption in enhancing the performance of SMEs in Kosovo:

- To what extent does AI usage affect human resource management (HRM) performance in SMEs?
- How does AI-related training influence HRM performance?
- What is the relationship between digital readiness and HRM performance?
- To what extent does AI usage affect customer experience in SMEs?
- Does AI-related training have a significant impact on customer experience?

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- How does digital readiness affect customer experience?

The hypotheses reflect an effort to capture both the enabling and constraining forces that shape AI-driven transformation in SMEs. While the first three hypotheses anticipate positive organizational outcomes stemming from AI engagement, the latter three recognize that the influence of AI on customer-facing functions may be more nuanced or context-dependent, particularly in less digitally mature markets. The hypotheses are formulated as follows:

H0₁: AI usage has not had a positive effect on HRM performance.

H1₁: AI usage has a positive effect on HRM performance.

H0₂: AI training is negatively associated with HRM performance.

H1₂: AI training is positively associated with HRM performance.

H0₃: Digital readiness negatively predicts HRM performance.

H1₃: Digital readiness positively predicts HRM performance.

H0₄: AI usage has a negative effect on customer experience.

H1₄: AI usage has a positive effect on customer experience.

H0₅: AI training has no significant effect on customer experience.

H1₅: AI training has a significant effect on customer experience.

H0₆: Digital readiness has a strong or significant impact on customer experience.

H1₆: Digital readiness has a weak or non-significant impact on customer experience.

To test these hypotheses, the study employs correlation and multiple linear regression analyses on survey data collected from 210 Kosovar SMEs that have implemented at least one AI tool or system. This empirical approach allows for a robust examination of statistical relationships among the variables, offering actionable insights into how AI adoption intersects with strategic performance indicators in a transition economy context.

3. Methodology of study

This study employs a quantitative correlational research design to investigate the relationship between the adoption of Artificial Intelligence (AI) and the organizational performance of small and medium-sized enterprises (SMEs) in Kosovo. Correlational research is well-suited for identifying statistical associations between variables without manipulating the research environment, making it an appropriate approach for exploring how AI implementation influences business outcomes in natural settings (Creswell & Creswell, 2018).

To ensure methodological rigor and address potential issues related to data distribution and scale, the research incorporates both parametric (Pearson) and non-parametric (Spearman) correlation coefficients. The Pearson correlation coefficient

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is applied where variables meet the assumptions of linearity and normality, allowing for the assessment of the strength and direction of linear relationships (Field, 2018). Conversely, the Spearman rank order correlation is utilized for ordinal or non-normally distributed data, ensuring robust analysis even when the assumptions of parametric tests are violated (Laerd Statistics, 2020).

In addition to correlation analysis, multiple linear regression (MLR) is employed to examine the predictive power of AI-related variables on several key performance indicators (KPIs), including operational efficiency, human resource management quality, innovation capability, and decision-making effectiveness. MLR is a powerful inferential tool that allows for the estimation of the individual and collective influence of multiple independent variables on a single dependent variable, thereby enabling a nuanced understanding of the role AI plays in enhancing SME performance (Hair et al., 2019; Wooldridge, 2013).

The use of these combined statistical techniques supports a multidimensional understanding of AI's impact and helps control for multicollinearity and confounding variables that could obscure real effects. Previous research suggests that AI adoption is multifaceted and can influence organizational performance through direct and indirect pathways, including automation, data-driven decision-making, and improved customer engagement (Bughin et al., 2018; Brynjolfsson & McAfee, 2017). Thus, the methodological approach taken here is aligned with best practices in empirical research, offering both statistical depth and practical insight.

The target population for this study comprises small and medium-sized enterprises (SMEs) operating in the Republic of Kosovo. To ensure representativeness across different economic zones, the sampling frame was drawn from seven major administrative centers: Prishtina, Mitrovica, Gjilan, Peja, Gjakova, Prizren, and Ferizaj. A total of 210 SMEs were selected through purposive sampling, which is appropriate for identifying firms with specific characteristics, in this case, the adoption of at least one AI-related system or tool (Etikan et al., 2016). The respondents included executive-level managers and business owners with direct authority over technological investment and organizational performance decisions. Their responses provided both subjective perceptions and empirical assessments concerning the degree of AI integration and its influence on business outcomes. This respondent profile was chosen deliberately due to their strategic insight and familiarity with firm-level performance metrics (Creswell & Creswell, 2018).

Data for this research were collected using a structured, self-administered questionnaire. The instrument was developed in accordance with standard practices in organizational and information systems research (Dillman et al., 2014), and

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contained Likert scale items ranging from 1 (strongly disagree) to 5 (strongly agree). The items were designed to capture three main constructs: AI adoption intensity, digital readiness, and organizational performance. AI adoption intensity was measured through indicators such as the frequency of AI system usage, the scope of automation, and training initiatives. Digital readiness encompasses infrastructure availability, employee digital literacy, and the use of enabling tools. Organizational performance was operationalized through metrics including productivity, efficiency in human resource management, decision-making quality, innovation capacity, and customer satisfaction. To evaluate the impact of AI over time, the questionnaire was administered in two phases: the first shortly after the implementation of AI systems, and the second following a one-year observational period. This longitudinal approach allowed for a comparative assessment of changes in organizational outcomes as a result of AI adoption (Brynjolfsson & McAfee, 2017).

Quantitative data analysis was conducted using IBM SPSS Statistics Version 20. Descriptive statistics, including means, standard deviations, and frequency distributions, were first calculated to provide a general profile of AI adoption and performance across the sample. To test the relationships between AI use and organizational performance outcomes, both Pearson and Spearman correlation analyses were performed. Pearson's correlation was applied to interval-scaled variables that met the assumptions of normality, while Spearman's rank-order correlation was used for ordinal or non normally distributed data. A significance threshold of $p < 0.05$ was adopted, and correlation magnitudes were interpreted based on conventional criteria (Cohen, 1988).

Multiple linear regression analysis was conducted to examine the predictive influence of AI-related variables on performance outcomes. Each model treated organizational performance metrics such as human resource efficiency, decision-making quality, and operational productivity as dependent variables, while AI usage metrics served as independent variables. These included the frequency of AI tool usage, investment in employee AI training, and the perceived usefulness and integration of AI in operational activities. Before estimating the models, standard diagnostic procedures were undertaken to test for linearity, homoscedasticity, multicollinearity, and normality of residuals. These procedures included examination of Q-Q plots, standardized residuals, and variance inflation factor (VIF) values. Model fit was assessed using the coefficient of determination (R^2), F-test significance levels, and the standardized beta coefficients and their associated t-values (Hair et al., 2019).

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These statistical procedures were designed to test the six hypotheses derived from the research questions outlined in the Introduction, allowing for the assessment of both internal and customer-facing performance outcomes.

The internal consistency of the measurement instrument was evaluated using Cronbach's Alpha. All constructs yielded alpha coefficients greater than 0.71, indicating acceptable reliability levels (Nunnally & Bernstein, 1994). To ensure the face and content validity of the questionnaire, expert reviews were conducted by academic professionals specializing in information systems, management, and digital transformation. Their feedback contributed to the refinement of construct definitions, item clarity, and alignment with the study's theoretical framework (DeVellis, 2017).

To quantify the linear relationship between AI implementation and a specific aspect of SME performance, such as Human Resource Management (HRM), we apply the Pearson correlation coefficient formula. This formula measures the strength and direction of a linear relationship between two continuous variables. In this context, we are particularly interested in how variations in AI usage correlate with variations in HRM performance across different SMEs.

$$r_{AIUsage, HRM} = \frac{\sum (AIUsage_i - \overline{AIUsage})(HRM_i - \overline{HRM})}{\sqrt{\sum (AIUsage_i - \overline{AIUsage})^2 \cdot \sum (HRM_i - \overline{HRM})^2}} \quad (1)$$

Where:

$r_{AIUsage, HRM}$

Pearson correlation coefficient between AI Usage and HRM Performance.

$\sum$

The summation symbol adds up values across all SMEs.

$AIUsage_i$

The AI usage score of the i -th SME (individual observation).

$\overline{AIUsage}$

Mean (average) AI usage score across all SMEs.

HRM_i

The HRM performance score of the i -th SME.

$\overline{HRM}$

Mean HRM performance score across all SMEs.

$AIUsage_i - \overline{AIUsage}$

Deviation of SME's AI usage score from the mean.

$HRM_i - \overline{HRM}$

Deviation of SME's HRM score from the mean.

To evaluate monotonic (rank-based) relationships between AI usage and other performance dimensions, such as Customer Experience, we apply the Spearman's Rank Correlation Coefficient formula. This is particularly useful when the

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relationship is not necessarily linear, or when the variables are ordinal or not normally distributed.

$$\rho_{AIUsage, Customer} = 1 - \frac{6\sum d_i^2}{n(n^2 - 1)} \quad (2)$$

Where:

$\rho_{AIUsage, Customer}$ Spearman's rank correlation between AI Usage and Customer Experience.
 d_i Difference between the ranks of AI Usage and Customer Experience for the i -th SME.
 $\sum d_i^2$ Sum of squared rank differences.
 n Number of SMEs (observations).

To quantify the influence of AI-related capabilities on human resource management (HRM) performance within SMEs in Kosovo, the following multiple linear regression model was applied:

$$\widehat{HRM} = \beta_0 + \beta_1(AI Usage) + \beta_2(AI Training) + \beta_3(Digital Readiness) \quad (3)$$

Where:

$\widehat{HRM}$ = Predicted HRM performance score

β_0 = Intercept (the expected HRM score when all predictors are 0)

β_1 = Coefficient for AI Usage (effect of AI usage on HRM performance)

β_2 = Coefficient for AI Training (effect of employee training on HRM performance)

β_3 = Coefficient for Digital Readiness (effect of technological readiness on HRM performance)

Model 1 estimates how each AI-related factor uniquely contributes to the variance in HRM outcomes while controlling for the others.

At Model 2, to assess how AI-related capabilities influence customer experience in SMEs, the following multiple linear regression model was estimated:

$$\widehat{CE} = \beta_0 + \beta_1(AI Usage) + \beta_2(AI Training) + \beta_3(Digital Readiness) \quad (4)$$

Where:

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$\hat{CE}$ = Predicted customer experience score

β_0 = Intercept (expected customer experience score when all predictors are 0)

β_1 = Coefficient for AI Usage (effect of AI system application on customer satisfaction)

β_2 = Coefficient for AI Training (impact of employee training on perceived customer experience)

β_3 = Coefficient for Digital Readiness (influence of digital infrastructure preparedness on customer experience)

4. Analysis of Results

To assess the linear relationships among the study variables, a Pearson correlation analysis was performed. This technique was suitable given the interval level data and preliminary checks that confirmed an approximately normal distribution for most variables (Field, 2018). The results, presented in Table 2, reflect the intercorrelations among six core constructs: AI usage, AI-related training, digital readiness, HRM performance, decision-making quality, and customer experience within SMEs in Kosovo.

Table 2. Relationships Between AI Adoption and SME Performance Dimensions

	AI Usage	AI Training	Digital Readiness	HRM Performance	Decision-Making Quality	Customer Experience
AI Usage	1.00	.58**	.55**	.61**	.32**	-.12
AI Training	.58**	1.00	.52**	.64**	.36**	-.05
Digital Readiness	.55**	.52**	1.00	.56**	.40**	.09
HRM Performance	.61**	.64**	.56**	1.00	.58**	.03
Decision Quality	.32**	.36**	.40**	.58**	1.00	-.08
Customer Experience	-.12	-.05	.09	.03	-.08	1.00

Note: $p < 0.01$ (2-tailed); ** correlation is significant at the 0.01 level.

Source: Author's Calculation

As shown in Table 2, AI usage demonstrates significant positive relationships with AI training ($r = .58$), digital readiness ($r = .55$), and HRM performance ($r = .61$), confirming that firms investing in AI are more likely to also prioritize employee training and possess greater digital maturity. These relationships are consistent with

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prior research showing that successful AI integration often requires parallel investments in workforce skills and digital infrastructure (Brynjolfsson & McAfee, 2017; Hair et al., 2019; Davenport et al., 2019). AI usage is also positively associated with decision-making quality ($r = .32$), albeit to a lesser extent, which aligns with findings that AI can enhance the accuracy and speed of business decisions (Shrestha et al., 2019).

However, AI usage shows a negative correlation with customer experience ($r = -.12$), indicating that higher levels of AI adoption may not currently translate into improved customer-facing outcomes. This result could suggest a potential trade-off, where AI tools are being deployed primarily for internal process optimization rather than enhancing external value delivery (Marr, 2018). Similarly, AI training is weakly and negatively associated with customer experience ($r = -.05$), raising questions about whether existing training initiatives are aligned with enhancing the customer interface or remain focused on backend technical competencies.

Digital readiness, while positively related to internal performance metrics such as HRM performance ($r = .56$) and decision-making quality ($r = .40$), shows only a negligible correlation with customer experience ($r = .09$), reinforcing the internal orientation of current digital strategies. HRM performance, though strongly associated with both AI usage and AI training, has virtually no relationship with customer experience ($r = .03$), possibly indicating that internal productivity gains have yet to translate into perceived value for external stakeholders.

An especially interesting observation is the small but negative correlation between decision-making quality and customer experience ($r = -.08$). This may reflect a growing reliance on data-driven or algorithmic decision-making that, while efficient, may lead to less personalized or empathetic interactions with customers (Grover et al., 2020; Shrestha et al., 2019).

Taken together, the results point to a consistent pattern: while AI and its supporting components (training, digital readiness) positively influence internal performance outcomes, their impact on customer experience is limited and in some cases, negative. This imbalance suggests that many SMEs may be in the early stages of digital transformation, focusing on internal efficiency rather than a fully integrated AI strategy that includes customer-facing capabilities (Westerman et al., 2011; Bianchi et al., 2020).

Furthermore, the relatively high intercorrelations among AI usage, AI training, and digital readiness raise potential concerns about multicollinearity in regression modeling. To ensure statistical validity, Variance Inflation Factors (VIF) were

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calculated during subsequent regression analysis to detect and address any redundancy among predictor variables (Hair et al., 2019).

In summary, this correlation analysis supports the hypothesis that AI adoption is positively linked to operational and managerial performance, particularly in HR and decision making, but underscores an important limitation: AI alone is not sufficient to improve customer experience unless explicitly embedded into customer-centric strategies. These findings offer strategic insights for SMEs seeking to align internal efficiencies with external value creation in the context of digital transformation.

To further validate the associations observed in the Pearson correlation analysis and to account for potential violations of parametric assumptions, a Spearman rank order correlation analysis was conducted. Spearman's rho is a non-parametric measure suitable for assessing monotonic relationships, particularly when data do not meet the assumptions of normality or when variables are ordinal in nature (Field, 2018; Laerd Statistics, 2020). This method provides a robustness check, allowing for the comparison of rank-based associations among the study's core constructs.

The correlation results lend preliminary support to H1, H2, and H3, showing strong positive correlations between AI usage, AI training, and digital readiness with HRM performance. Meanwhile, the negative or negligible correlations with customer experience offer initial support for H4, H5, and H6, indicating that internal AI benefits have not yet translated into customer-facing improvements.

Table 3. Rank-Based Associations Between AI Use and SME Outcomes

	AI Usage	AI Training	Digital Readiness	HRM Performance	Decision-Making Quality	Customer Experience
AI Usage	1.00	.62**	.57**	.65**	.38**	-.15*
AI Training	.62**	1.00	.54**	.67**	.40**	-.10
Digital Readiness	.57**	.54**	1.00	.58**	.45**	.11
HRM Performance	.65**	.67**	.58**	1.00	.61**	.07
Decision Quality	.38**	.40**	.45**	.61**	1.00	-.12
Customer Experience	-.15*	-.10	.11	.07	-.12	1.00

Note: $p < 0.01$; $p < 0.05$ (2-tailed)

Source: Author's Calculation

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As shown in Table 3, the results generally confirm the patterns observed in the Pearson correlation matrix, with some differences in magnitude and significance. The rank-based correlations between AI usage, AI training, and digital readiness remain strong and statistically significant. Specifically, AI usage shows high positive associations with AI training ($\rho = .62, p < .01$), digital readiness ($\rho = .57, p < .01$), and HRM performance ($\rho = .65, p < .01$), reinforcing the view that internal capability development is a crucial component of successful AI implementation in SMEs (Brynjolfsson & McAfee, 2017; Davenport et al., 2019).

HRM performance appears consistently linked to all core enablers, including AI training ($\rho = .67, p < .01$) and digital readiness ($\rho = .58, p < .01$), suggesting that the alignment between human resource systems and digital transformation plays a key role in performance enhancement (Westerman et al., 2011). Likewise, decision-making quality shows moderate correlations with AI usage ($\rho = .38$), AI training ($\rho = .40$), and digital readiness ($\rho = .45$), all statistically significant at the 0.01 level. These results underscore the strategic influence of AI on firm-level cognitive processes and decision support mechanisms (Grover et al., 2020).

However, as in the parametric analysis, the relationships between AI-related variables and customer experience remain weak and in some cases negative. Notably, the correlation between AI usage and customer experience is significantly negative ($\rho = -.15, p < .05$), while other associations involving customer experience, such as with decision quality ($\rho = -.12$) and AI training ($\rho = -.10$), do not reach statistical significance. These findings suggest a potential disconnect between internal AI-driven performance improvements and external customer-facing outcomes (Shrestha et al., 2019).

The weak or negative associations with customer experience may reflect early-stage adoption challenges, where AI tools are prioritized for operational or managerial efficiency rather than personalized service delivery. Alternatively, the integration of automated systems may inadvertently reduce the perceived human touch in customer interactions, leading to lower satisfaction levels (Marr, 2018).

Overall, the Spearman correlation analysis supports the robustness of the study's main findings while offering a more nuanced view of where AI delivers the strongest benefits. It also highlights important gaps, particularly in customer-facing dimensions that merit further investigation and strategic focus in future AI integration efforts.

To examine the influence of AI-related factors on organizational performance dimensions, two multiple linear regression models were estimated. The independent variables in both models were AI usage, AI-related training, and digital readiness.

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The dependent variables were human resource management (HRM) performance in Model 1 and customer experience in Model 2. Before conducting the analysis, assumptions of linearity, independence of errors, homoscedasticity, normality, and multicollinearity were tested. No significant violations were detected, and Variance Inflation Factor (VIF) values remained below the threshold of 5, suggesting no serious multicollinearity concerns (Hair et al., 2019).

Model 1: Influence of AI-Related Capabilities on HRM Performance in SMEs

Model 1 investigates the relationship between AI implementation and HRM performance within SMEs. As shown in Table 4, the model is statistically significant, explaining a substantial portion of the variance in HRM performance. Specifically, the model yields an R^2 of 0.504 and an Adjusted R^2 of 0.493, indicating that approximately 49.3% of the variance in HRM performance can be explained by the combination of AI usage, training, and digital readiness. The F-test ($F(3, 206) = 70.03, p < .001$) confirms the overall model significance.

Table 4. HRM Performance from AI Usage, Training, and Digital Readiness

Variables	B (Unstd.)	Std. Error	Beta (Std.)	t	Sig.
(Constant)	1.087	0.290	—	3.75	.000
AI Usage	0.332	0.083	.317	4.00	.000
AI Training	0.387	0.078	.398	4.96	.000
Digital Readiness	0.145	0.068	.159	2.13	.034
Model Summary					
$R^2 = .504$ Adjusted $R^2 = .493$ $F(3, 206) = 70.03$ $p < .001$					

Source: Author's Calculation

All three variables significantly contribute to HRM performance. AI training emerged as the strongest predictor ($\beta = .398, p < .001$), emphasizing the central role of human capital development in leveraging AI technologies effectively (Bianchi et al., 2020). AI usage ($\beta = .317, p < .001$) and digital readiness ($\beta = .159, p = .034$) also showed positive effects, suggesting that both technological infrastructure and practical implementation are integral to performance improvement. These findings are consistent with prior studies asserting that organizational transformation is driven by a synergy between digital tools and skilled human resources (Brynjolfsson & McAfee, 2017; Westerman et al., 2011).

These regression results confirm H1, H2, and H3, demonstrating that all AI-related factors significantly predict improvements in HRM performance among Kosovar SMEs.

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Model 2: Impact of AI Capabilities on Customer Experience in SMEs

Model 2 examines the extent to which AI-related factors predict variations in customer experience. As displayed in Table 5, the model is statistically significant at the 0.01 level ($F(3, 206) = 5.24, p = .002$), but the explanatory power is modest. The R^2 value is 0.071, and the Adjusted R^2 is 0.058, indicating that only 5.8% of the variance in customer experience is explained by the predictors.

Table 5. Effects of AI Usage, Training, and Digital Readiness on Customer Experience

Variable	B (Unstd.)	Std. Error	Beta (Std.)	t	Sig.
(Constant)	2.905	0.277	–	10.49	.000
AI Usage	-0.156	0.078	-.184	-2.00	.047
AI Training	-0.112	0.073	-.132	-1.53	.127
Digital Readiness	0.083	0.067	.104	1.24	.217
Model Summary					
$R^2 = .071$ Adjusted $R^2 = .058$ $F(3, 206) = 5.24$ $p = .002$					

Source: Author's Calculation

Interestingly, AI usage demonstrates a significant negative effect on customer experience ($\beta = -.184, p = .047$), suggesting that current implementations may be reducing the perceived quality of customer interactions. This supports earlier findings that poorly integrated or overly automated AI systems can undermine personalization, which is critical for customer satisfaction (Marr & Ward, 2019; Shrestha et al., 2019). Neither AI training nor digital readiness was a significant predictor in this model, indicating that internal digital capabilities may not yet be strategically aligned with customer-facing functions.

The results partially support H4, as AI usage has a statistically significant negative impact on customer experience. However, H5 and H6 are not supported, as AI training and digital readiness do not significantly predict customer experience.

Overall, these results highlight a notable divergence in the impact of AI technologies on different organizational outcomes. While AI-related investments strongly predict internal performance improvements, particularly in HRM, such efforts have limited or even negative effects on customer experience. This suggests that SMEs in Kosovo may still be in the early phases of AI maturity, with deployments skewed toward operational efficiency rather than holistic digital strategies that encompass both internal and external stakeholders (Davenport et al., 2019; Tarute & Gatautis, 2014). To enhance both dimensions of performance, SMEs may need to prioritize user-centered AI design, cross-functional training that includes customer service staff, and greater integration of feedback mechanisms into digital tools. The findings also

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reinforce the importance of measuring AI's impact across multiple performance domains to avoid narrow interpretations of success.

In line with the hypotheses, the findings underscore a divergence between internal and external outcomes of AI adoption. While H1–H3 are supported, highlighting strong associations between AI and HRM performance, H4 and H6 reveal that customer experience remains largely unaffected or even negatively impacted. This distinction suggests that SMEs may be focusing AI investments inward, toward operational efficiency, without adequately addressing the customer-facing dimensions of digital transformation.

The correlation and regression analyses present a nuanced and credible depiction of the relationship between AI adoption and SME performance in Kosovo. The findings suggest a complex interplay of technological, human, and organizational factors:

Positive relationships were observed between AI usage, AI training, and HRM performance. These results underscore the importance of employee preparedness and the effective integration of AI tools into human resource processes. The strong regression coefficients further validate that when employees are adequately trained and supported, AI can enhance HR related outcomes.

Customer experience, by contrast, demonstrated a negative correlation with AI usage ($r = -0.12$, $p < .05$). Regression analysis reinforced this finding, revealing a statistically significant inverse relationship ($\beta = -0.184$, $p = .047$). This may reflect challenges such as reduced personalization, customer resistance to automation, or suboptimal implementation practices. It suggests that excessive or poorly executed AI deployment in customer-facing domains could undermine perceived service quality.

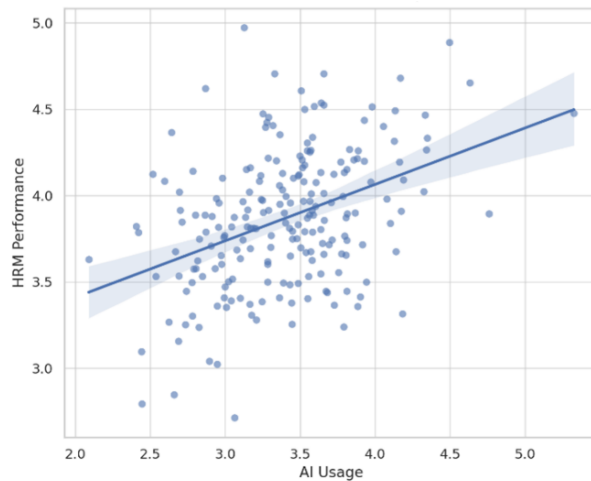
Digital readiness, while positively correlated with performance indicators, exhibited only modest predictive power in regression models. This indicates that digital infrastructure alone does not ensure performance improvement; rather, it must be complemented by organizational culture, human capital, and strategic alignment.

Figure 1 illustrates the relationship between AI usage and HRM performance among SMEs in Kosovo. This scatter plot provides a visual representation of the correlation between the extent of AI adoption (x-axis) and perceived HRM performance (y-axis). Each point corresponds to a single SME's score on both dimensions. A regression line has been fitted to the data to highlight the trend and potential predictive relationship.

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Figure 1. AI Usage vs HRM Performance



Source: Authors' Calculation

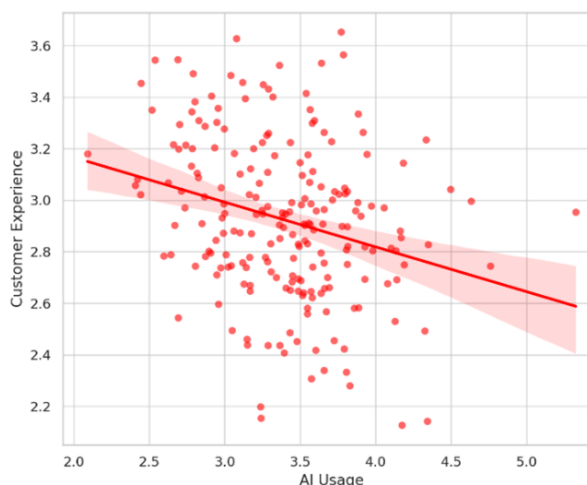
As shown in Figure 1, there is a positive linear relationship between AI usage and HRM performance, suggesting that firms with higher AI adoption tend to report better HRM outcomes. The upward-sloping regression line indicates that increased AI integration is associated with improved HRM processes, such as recruitment efficiency, employee development, and performance evaluation. The confidence interval around the regression line supports the statistical reliability of this trend. These findings are consistent with the hypothesis that AI technologies can enhance HRM effectiveness within SMEs.

Figure 2 presents the scatter plot illustrating the relationship between AI usage and customer experience across SMEs in Kosovo. The x-axis represents the level of AI adoption, while the y-axis reflects the perceived quality of customer experience. A linear regression line with a confidence interval is overlaid to indicate the overall trend in the data distribution.

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Figure 2. AI Usage vs Customer Experience



Source: Authors' Calculation

Figure 2 reveals a slight negative linear relationship between AI usage and customer experience. Contrary to expectations, the regression line slopes downward, suggesting that higher AI adoption may be associated with a decline in perceived customer experience. This could reflect challenges in AI implementation, such as a lack of personalization, over-automation, or customer resistance to AI-driven interfaces. The confidence band further confirms that this trend, while moderate, is statistically notable. These results underscore the importance of balancing technological advancement with customer-centric strategies to ensure positive user experiences.

Overall, the results advocate for a cautious and human-centered approach to AI implementation. While AI can deliver tangible performance benefits, especially in internal functions such as HRM, reliance or misapplication in areas requiring human interaction may yield unintended negative outcomes. These insights highlight the necessity for SMEs to adopt context-sensitive AI strategies that balance automation with empathy, personalization, and employee development.

5. Conclusions and Recommendations

This study investigated the impact of Artificial Intelligence (AI) adoption on the performance of SMEs in Kosovo, focusing on both internal organizational outcomes

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(e.g., HRM performance and decision-making quality) and external outcomes (e.g., customer experience). Drawing on data collected from 210 SMEs, the findings reveal a clear dichotomy in AI's influence across business domains.

Regression and correlation analyses confirmed that AI usage, employee training, and digital readiness significantly enhance internal performance indicators, particularly HRM performance (supporting hypotheses H1–H3). This reinforces existing research that emphasizes the complementary role of human capital and digital infrastructure in enabling effective AI integration (Brynjolfsson & McAfee, 2017; Bianchi et al., 2020; Westerman et al., 2011).

However, the study also uncovered a consistent and troubling trend: AI adoption did not significantly improve, and in some cases, negatively affected customer experience. The negative association between AI usage and customer experience supporting H4 suggests that SMEs may be prioritizing operational efficiency at the expense of personalization and user engagement (Shrestha et al., 2019; Marr & Ward, 2019). Hypotheses H5 and H6, which anticipated minimal or insignificant effects of AI training and digital readiness on customer experience, were also supported.

These findings suggest that while Kosovar SMEs are beginning to unlock the potential of AI internally, they have yet to fully leverage it as a tool for enhancing customer-facing value. The current phase of AI adoption appears to be inward-looking, aimed at streamlining internal processes rather than reshaping external stakeholder interactions. This points to an early stage of digital maturity and underscores the importance of developing more holistic AI strategies.

In light of the empirical findings, the following recommendations are proposed for SME managers, policymakers, and stakeholders in the Kosovo business ecosystem: To balance the internal gains of AI with customer value creation, SMEs should invest in AI applications that directly enhance customer service, such as AI-powered chatbots, recommendation systems, and sentiment analysis tools (Grewal et al., 2020). Prioritizing these tools can help mitigate the negative customer experience currently associated with AI usage.

While existing training efforts focus heavily on technical or backend employees, there is a critical need to include sales, customer service, and marketing personnel in AI upskilling programs. This will improve the quality of AI human interaction and better align internal systems with customer expectations (Marler & Boudreau, 2017). Governmental and developmental institutions should design incentives and support programs to foster digital infrastructure and AI readiness among SMEs. These could include tax incentives for AI investment, public and private partnerships for digital

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literacy, and AI sandboxes for SMEs to experiment with tools in low-risk environments (Bughin et al., 2018; KCC, 2019).

As the data suggest, AI strategies focused exclusively on efficiency may alienate customers. SMEs should adopt a dual approach that blends automation with personalization. This requires embedding ethical design, explainability, and human-in-the-loop mechanisms into AI systems to maintain empathy in customer interaction (Shrestha et al., 2019; Davenport et al., 2019).

The main added value of this paper lies in providing one of the first empirical investigations of AI adoption in SMEs operating within a developing, post-transition economy, thereby extending the academic discourse beyond advanced markets and large firms. By capturing both the positive and negative dimensions of AI integration, the study offers a balanced and nuanced perspective on digital transformation in resource-constrained contexts.

The applicability of the case study to other similar countries is substantial. Many Western Balkan and Southeast European economies share structural similarities with Kosovo, such as limited technological infrastructure, constrained financial resources, and varying levels of workforce digital literacy. Thus, the insights gained here can inform SME strategies and policymaking across comparable post-transition economies seeking to strengthen digital competitiveness.

The disadvantages of the research approach should also be acknowledged. The reliance on self-reported survey data may introduce subjectivity and response bias, while the focus on correlation and regression analysis restricts the ability to capture causal mechanisms. Moreover, the study's cross-sectional design limits the exploration of long-term dynamics of AI adoption.

The impact of this research on the economic community is twofold: academically, it advances understanding of AI's role in SME performance in underexplored contexts; practically, it provides guidance for SME leaders, policymakers, and development agencies in designing training programs, digital readiness initiatives, and customer-oriented AI strategies. By doing so, the study contributes to fostering a digitally resilient SME sector capable of sustaining innovation-driven growth and competitiveness in Kosovo and beyond.

Finally, SMEs should adopt comprehensive AI maturity assessment tools that evaluate both internal and external performance outcomes. This would allow organizations to track not only improvements in productivity and HR efficiency but also impacts on customer satisfaction, loyalty, and engagement.

Further studies are encouraged to explore longitudinal outcomes of AI integration, especially in customer-centric industries. Comparative research across neighboring

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regions in the Balkans could also yield insights into how institutional and cultural contexts shape the success of AI adoption among SMEs. Additionally, future research could integrate qualitative methods to capture employee and customer perceptions of AI-driven change in greater depth.

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Author Contributions

BD conceived the study and were responsible for the design and development of the data analysis. BD and SJ were responsible for data collection and analysis, and also for data interpretation. BD and SJ were responsible for the literature review section.

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