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AI Adoption in SMEs and Its Economic Impact on Pakistan's Development

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ABSTRACT

Purpose

This paper investigates the adoption of Artificial Intelligence (AI) by Small and Medium Enterprises (SMEs) in Pakistan and explores its potential economic implications at both organizational and national levels.

Design/Methodology/Approach

The study is based on survey data collected from 368 SMEs across multiple industries. It examines adoption patterns, levels of investment, perceived benefits, and the barriers hindering widespread integration of AI.

Findings

Results reveal that nearly two-thirds of SMEs have already adopted AI, with the highest application observed in marketing, sales, and customer service, while adoption in HR and product development remains limited. Efficiency, cost reduction, and improved decision-making emerged as the primary drivers for adoption. However, challenges such as high implementation costs, skill shortages, limited awareness, and resistance to change continue to impede broader integration. The analysis further demonstrates a strong positive association between AI adoption, productivity gains, and revenue growth, which collectively enhance organizational competitiveness and contribute to national economic development.

Practical Implications

The findings highlight the need for targeted policy support, educational initiatives, and financial incentives to enable SMEs to overcome structural and resource-related barriers. These measures are critical for accelerating AI integration, strengthening SME competitiveness, and fostering sustainable digital transformation.

Originality/Value

This study contributes to the limited body of empirical research on AI adoption among SMEs in developing economies, particularly within the Pakistani context. By offering insights into adoption patterns, challenges, and economic outcomes, it provides valuable guidance for policymakers, entrepreneurs, and industry stakeholders in advancing technology-driven growth.

Keywords: *Artificial Intelligence, SMEs, Adoption Barriers, Productivity, Economic Development*

INTRODUCTION

It has been dubbed that Small and Medium Enterprises (SMEs) are the pillars of national economies based on their critical role in the creation of employment, and the innovation and development of the economy (Khan, 2023). The SMEs in Pakistan make up about 90 percent of all business and also influence the GDP, exports and employment. Even as markets are still being pushed to the limit through the forces of globalization and technological shocks, SMEs are actually under pressure to stay competitive, effective and robust (Soomro et al., 2024). Artificial Intelligence (AI) is one of the most influential agents of digital transformation in the global business environment due to its role as one of the emerging technologies that have transformed the world of business (Ahmed, 2025). AI has emerged as a strategic instrument to help organizations to maximize the available resources and become more competitive, through predictive analytics and customer insights to process automation and smart decision-making (Khan et al., 2024). Although multinational corporations have been at the forefront of adopting AI, there is increased awareness that SMEs, particularly in developing economies like Pakistan, could actually gain equal benefit in adopting AI solutions in their operations (Khan et al., 2025).

The implementation of AI in SMEs has more than just an impact on the performance of the firm. Macroeconomically, AI can accelerate the development of the nation by making it more productive, eliminating operational inefficiencies, and enhancing innovation (Ullah & Khan, 2024). Pakistan is a country where SMEs are a key driver of the country's economic life, and, in this case, the introduction of AI technologies can help attain sustainable development levels, resolve the issue of unemployment, and become more competitive in the world (Afshar & Shahm 2025). Nonetheless, the implementation of AI in SMEs in Pakistan remains immature relative to the developed economies. Financial constraints, shortage of skilled human resources, technological change resistance, and security of information are all major challenges (Jamil et al., 2025). These issues pose such critical questions as how SMEs in Pakistan are embracing AI, the degree to which a business is boosting its economic performance, and the implication of the issue on general development.

The discussion of the introduction of AI by SMEs has received a lot of coverage in the recent past across the world. Smaller companies also use AI in increasingly developed economies to achieve competitive advantages in supply chain optimization, customer relationship management, and digital marketing (Afshar & Shah, 2025). Indicatively, the productivity and profitability of European and North American SMEs have shown improvements when they integrated AI-based technologies like chatbots, recommendation systems, and predictive analytics (Alim et al., 2025). Conversely, SMEs in developing nations tend to experience problems with digital infrastructure, cost, capacity-building, and this slows down the adoption process. The significance of contextual research to study the manner in which AI adoption is taking shape in particular economic and cultural settings like the one in Pakistan is highlighted by this contrast (Ahmad & Museera, 2024).

Pakistani business environment offers opportunities and challenges to AI integration. On the one hand, the high level of young and technology-oriented population, the quick process of the country digitalization, and the development of the entrepreneurial culture create the favorable environment to be

used in adopting AI (Atif, 2024). The rise of e-commerce, fintech, and electronic service platforms also highlight the increasing contribution of technology to the modelling of the business.

Conversely, infrastructural bottlenecks, lack of consistent support of the policy, and inadequate investment in research and development remain some of the factors that restrain the broad application of more advanced technologies (Fauz et al., 2025). The lack of awareness of SME owners concerning the feasible applications of AI and its potential value in terms of efficiency-improvement is a red-hot issue (Hussain and Rizwan, 2024). So, it is necessary that the policy makers, business leaders and scholars, know how SMEs in Pakistan manage to survive these dynamics.

AIs can be very useful in the firm level improving efficiency and competitiveness. SMEs have a character of operating small-scale and one will desire to get the maximum out of any input necessary to increase output. The AI tools AI tools that help SMEs to optimize their operations by reducing wastage, forecasting demand, customer segmentation, automated financial analysis, and more can also help them respond quickly to market changes (Atif et al., 2024). Also, AI can enable SMEs to make informed decisions, the one that is favorable in the environment where uncertainty and volatility exist. Within customer-facing business case, the application of AI-based services can lead to increase in the degree of customer satisfaction and customer loyalty which in turn, sparks an expansion of revenues (Alam et al., 2025). It is worth noting that AI implementation is not a technical intervention but a strategic action that can determine the future of success of the SMEs in the competitive markets.

At the national level, the economic effects of AI integration among the SMEs can be enormous. Since the SMEs contribute considerable percentages of total GDP and labor of Pakistan, an increase in their productivity and profitability would lead to an increase in the national product, growth in taxation and economic stability (Khan, 2023). Moreover, AI-powered SMEs also have the potential in making Pakistan global value chains, i.e., by responding to international demands of efficiency, quality, and innovation (Majeed et al., 2025). It is also because of increased competitiveness of SMEs that an entrepreneurial ecosystem becomes more dynamic and can attract investment and encourage innovation in other areas (Hanif, 2024). Effects of AIs on SMEs are therefore not exclusive to the individual firms but have driving developmental influences, including poverty reduction, social inclusion, and online empowerment (Saleem et al., 2023).

This is a good indicative but nonetheless there are several barriers to the adoption of AI by the SMEs of Pakistan. High implementation cost has been one of the most significant deterrents particularly to small businesses having low financial abilities. Another issue is that cheap and tailored AI-based solutions are also a challenge to many SMEs (Hasan et al., 2025). The lack of experts who could handle AI systems also plays its role, resulting in the skills gap that renders the efficient implementation unfeasible. Another reason is that the rate of adoption is also impeded by the unwillingness of business owners and employees to change because of the fear of losing the job or because of uncertainty regarding technology (Umer et al., 2024). There are also data security challenges, privacy and regulatory challenges, which need to be addressed to win the trust of AI systems. These problems indicate that there is a necessity to take action in terms of policies, capacity building actions, and awareness initiatives that will ensure that the adoption of AI among the SMEs will become much more manageable (Gillani et al., 2025).

The significance of the study lies in that it addresses the knowledge gap that currently exists in the research due to the exploration of the use of AI in Pakistani SMEs and its economic impact (Butt & Yazdani, 2023). Even though the studies within the developed economies have already established the benefits of AI-implementation in smaller businesses, little is known about how the SMEs in Pakistan perceive the use and effects of the AI technologies (Ali et al., 2024). The scope of the study is opportune given the role of SMEs in the economy of Pakistan thus could be utilized as a guideline to the policy makers, business strategies and even to contribute to the research literature. The study will bring an

insight into the way technological innovation can be used as a driver of economic growth in Pakistan by examining the drivers and issues as well as the results of the implementation of AI in SMEs (Hafeez & Sharif, 2025).

Moreover, the study is especially applicable in the background of the Pakistani ambition to adopt digital transformation as one of the national development objectives. Government programs like the Digital Pakistan have resonated the role of technology in spurring growth and better service delivery (Manzoor et al., 2021). However, the policy frameworks may not do much to address the needs of one of the most significant sectors of the economy without the knowledge of the practical realities of how SMEs are embracing AI (Shahzad et al., 2025). This research would be useful in developing interventions related to inclusive and sustainable adoption of AI since it may help to construct the notions of intervention by providing empirical data on the trends of adoption, investment rate, perceived advantages, and the obstacles to adoption experienced by SMEs (Arif et al., 2024).

In conclusion, the use of AI in SMEs is a challenge and opportunity of developing Pakistan. Although the factors of lack of skills and change resistance are still one of the major obstacles, the opportunities of AI implementation in the productivity, competitiveness and economic development cannot be ignored. The study will add to the existing literature on AI technologies adoption among SMEs in Pakistan and the impact of such choices on the economic performance. The insights obtained in the process of conducting this research will not only enrich the academic knowledge base but also offer certain practical suggestions to business practitioners and policy-makers that aim at using AI to help in development of the socioeconomic sector of Pakistan.

Objectives of the Research

- To analyze how Artificial intelligence can be used to increase the efficiency, productivity, and competitiveness of Small and Medium Enterprises (SMEs) in Pakistan.
- To find out the main challenges and barriers to the implementation of AI technologies by SMEs, such as financial, technical, and infrastructural constraints.
- To examine the possible economic and developmental effect of implementing AI within the SMEs, in the context of innovation and the effect on the employment and market growth.
- To introduce policy interventions, support systems within the institution and strategic interventions that may empower and speed up the process of adoption of AI by SMEs in Pakistan.

Problem of the Statement

The SMEs have a major role in the Pakistani economy since they are involved into the generation of employment, innovation and general economic growth, which are among the highest. With the current competitive market environment in the global market, however, efficiency, scalability, and sustainability of business models embraced by SMEs are challenged. Artificial Intelligence (AI) is also a game-changing tool that can transform the business operations and decision-making and innovation radically. Although AI has been proven to have a significant positive impact on SMEs all over the globe, AI adoption among Pakistani SMEs is still underdeveloped because of the high prices of the technology, untrained and unskilled labor force, and the absence of awareness and infrastructural barriers. This gap leaves a burning question as to the level of adoption of AI, the obstacles impeding its adoption and how it may affect the development of Pakistan economically.

LITERATURE REVIEW

The Role of SMEs in Economic Development

Small and Medium Enterprises (SMEs) have always been considered as key to the economic growth, creation of employment, and social development in all parts of the world. They are said to be the pillars of the developing and emerging economies as they are largely involved in the local markets, add to Gross Domestic Product (GDP) and provide livelihoods to the millions of people (Madanchian et al., 2015). SMEs are the leading business enterprises in Pakistan which are very vital in terms of industrial productivity, exportation and the development of the nation. These businesses encourage entrepreneurship, promote development of the region and offer flexibility to the changes in the market environment (Ilyas & Ilyas, 2024). Creating employment opportunities especially to the young and the women, SMEs not only bring a sense of financial stability but also inclusivity in the society (Raza et al., 2023). Their innovative capacity and responsiveness to the needs of their customers are the factors that provide them with a clear competitive advantage over bigger companies that are not as adaptable (Ullah et al., 2023).

Nonetheless, SMEs are prone to numerous challenges such as inadequate financial resources, absence of technological infrastructure and managerial inefficiencies eventhough they are important. In the developing economies such as Pakistan, accessibility to credit, formal training and advanced technologies are some of the challenges faced by SMEs. These limitations limit their expansion of operations and global competition (Sadia, 2020). Consequently, enhancing SMEs has emerged as one of the concerns of most governments and developmental organizations as a channel to the attainment of sustainable economic development.

Artificial Intelligence as a Transformational Technology

Artificial Intelligence (AI) has already established itself as one of the most groundbreaking technologies of the 21st century, as it has turned the industries upside down and re-defined the business models. In essence, AI is linked to the utilization of algorithms and calculating machines to carry out the tasks that have traditionally been believed to belong to the domain of human thinking, such as problem-solving, learning, reasoning, and decision-making (Ashfaq et al., 2025). There are numerous applications of it that comprise natural language processing, predictive analytics, robotics, machine learning. AI can offer a business an opportunity to automate their processes, enhance their customer experience and decision-making. The AI-supported systems can work through large amounts of data more easily than ever and enable the firms to identify trends and opportunities related to innovation (Fahad et al., 2022). The global business environment is becoming more dependent on AI to perform supply chain optimization, detect fraud, personal marketing and human resource management. AI use is not a choice anymore but a need in order to remain competitive in the fast-changing markets.

AI Adoption in SMEs

SMEs are gradually realizing the opportunities of AI, even though the largest companies have been in the vanguard in integrating AI (Cooper, 2025). Efficiency in SME operations, reduction in costs and responsiveness to the market have been associated with the use of AI by SMEs. As an example, the AI-based solutions allow the SMEs to automate their daily processes, reduce the administrative overhead, and make better decisions (Jalil et al., 2025). Virtual assistants and chatbots improve customer service, and predictive analytics is used to manage the in-store stock and make predictions (Wei and Pardo, 2022). The digital marketing AI allows the SMEs to customize adverts and target clients more effectively leading to better sales.

In spite of these advantages, there are some difficulties in the implementation of AI by SMEs. The barrier of high implementation costs is still present since most of the smaller businesses have a modest budget.

The absence of the experts to design, operate and maintain AI systems also makes it hindered (Lai et al., 2025). In addition, SMEs are the least informed about the possibility of adapting AI technologies to their requirements. Data privacy and security concerns and staff resistance towards change also slows down the adoption rate (Pathan et al., 2017). The developing economies with less technological preparation and digital infrastructure have more urgent problems.

Barriers to AI Adoption in Developing Countries

The issue of AI adoption is a particular concern of SMEs in developing countries as opposed to the situation in developed economies. Financial constraints is one of the largest challenges that cannot be avoided because AI investment can turn out to be highly expensive, both in software, hardware, and training in the short-term (Ramish et al., 2025). More to the point, there is often limited access to cheap financing because of bad credit markets and collateral is frequently unavailable. The other important hindrance is the lack of digital skills. The AI systems also involve the use of the data science, programming, and machine learning experience, which may not be readily available in the developing worlds (Nazir et al., 2022). SMEs also have no requirement to implement AI in tactical decisions since they cannot do it without managerial knowledge. Even more restrictive to AI adoption are the technology aspects, resistance to change, fear of job loss, and the culture. The other constraints are poor infrastructure such as lack of good internet connectivity, lack of cloud computing systems and access to good data. The SMEs are at liberty to push through all these challenges with no assistance of the government, thereby leading to a slow adoption and non-balanced distribution of the benefits of this responsibility across the sectors, unless well-structured regulatory frameworks and government policies are in place (Arshad et al., 2020).

Economic Implications of AI Adoption in SMEs

The economic consequences of the application of AI in the example of SMEs are broader and not restricted to one company. On the micro level of the economy, AI can save money, make SMEs more productive, and competitive (Hassan et al., 2023). Armed with the power of data-driven insights, SMEs can create new products, offer high quality services and enter new markets. The upgrades are more lucrative and business sustaining.

The effects of such extensive use of AI by SMEs can be large-scale developmental consequences at the macroeconomic level. The collective increase in productivity of the SMEs can result in the expansion of the national GDP, employment, and improved remuneration can be used to alleviate poverty and improve social development (Irum et al., 2025). Another method of establishing ecosystems of innovation is through the adoption of AI, which fosters the collaboration of SMEs, research and technology providers. This ecosystem promotes a rapid diffusion of technology and creates spill over benefits in industries.

In the case of developing nations such as Pakistan, artificial intelligence in the SMEs may offer them as a means to modernize the industry and integrate with the rest of the world. SMEs will get an opportunity to contribute more to the global value chains and they are expected to attract foreign investments as they will become more efficient and competitive (Farooq et al., 2024). The policy of national development is also aligned with the use of AI, being more oriented on the digital transformation, new technologies, and sustainability (Alim et al., 2025). Nevertheless, to achieve these economic advantages, it is important to overcome systemic obstacles and make the introduction of AI non-discriminatory and available to the largest possible proportion of SMEs.

Policy and Institutional Support for AI Adoption

Governments and policy institutions are very crucial in ensuring that AI is adopted among SMEs. The burden of costs of AI investments can be mitigated through financial incentives, tax favors and subsidized

loans (Afshar & Shah, 2025). The skills gap can be bridged with the help of training programs and capacity-building initiatives, and the awareness campaigns can raise the awareness of the SME owners regarding the potential benefits of AI.

Also, collaborations between research, business and university may lead to innovation and the development of cheap solutions of AI based on the requirements of SMEs. Digital infrastructure such as broadband and the cloud are also important in facilitating the adoption and scaling of AI solutions by SMEs (Hasan et al., 2025). The regulatory frameworks should deal with the problems of data privacy, cybersecurity, and responsible use of AI to build trust and guarantee responsible implementation.

In Pakistan, other projects like the vision of digital Pakistan bring out the desire of the government to utilize technology to grow (Atif, 2024). Nevertheless, in order to turn the vision into practice, specific actions focused on SMEs should be taken. In the absence of such a support, the use of AI would become limited to bigger companies and SMEs would be left out as part of the digital transformation process (Khan et al., 2025).

Synthesis of Literature

The literature shows that there is agreement on the transformative potential of AI to SMEs especially when it comes to increasing efficiency, competitiveness and innovation. At the same time, it sheds light on the insurmountable hurdles that hamper adoption especially on the emerging situations like that of Pakistan.

The economic impact of AI introduction is significant, as it not only enhances the performance of companies but also the expansion of the countries with the rise of productivity and a break into the world markets. The need policy support, infrastructure development, building capacity can be raised as the conditions that the potential of AI needs to be utilized by SMEs.

Significance of the Study

This is so because the current study is committed to the issue of the application of Artificial Intelligence (AI) in Small and Medium Enterprise (SME) in Pakistan and how it can influence the development of this nation. The study offers information that is useful to policymakers, entrepreneurs and industry heavy weights, in terms of identifying the opportunities and the challenges of the AI integration. The result hints at the potential of AI turning SMEs into more productive, innov-active, and competitive since they are the engine of the Pakistani economy. The paper also highlights the importance of supportive measures and training schemes and policy frameworks that will facilitate increased adoption of AI, which will eventually lead to a sustainable economic growth and development in Pakistan.

METHODOLOGY

The research design was a quantitative one, which was used to investigate the adoption of AI in SMEs and the economic consequences of AI adoption in Pakistan. The structured questionnaire was administered to SME owners and managers in the main industries such as services, manufacturing, retail/wholesale, and technology, as primary data collection was done. A total of 368 valid responses were obtained, representing diverse business sizes and years of operation.

The questionnaire consisted of close-ended questions measuring demographic characteristics, levels of AI adoption, areas of implementation, reasons for adoption, investment levels, challenges faced, and outcomes in terms of productivity, revenue growth, and economic contribution. Responses were recorded using nominal, ordinal, and Likert-type scales.

Demographic data were presented in different bar charts, pie charts and many more diagrams. Data was analyzed using descriptive and inferential statistical methods. Frequencies and percentages were used to summarize adoption patterns and challenges. Cross-tabulation was applied to explore relationships between business characteristics and AI adoption. The analysis also included interpretation of productivity and revenue impacts to assess organizational and economic outcomes.

The methodological approach ensures reliability through a sufficiently large sample size and validity through alignment of survey items with the study's objectives. This design enables a comprehensive understanding of AI adoption trends in SMEs, its barriers, and its role in enhancing organizational competitiveness and contributing to national economic development.

DATA ANALYSIS

Data analysis is the systematic process of collecting, cleaning, transforming, and interpreting data to identify patterns, relationships, and trends that support informed decision-making. It involves applying statistical, computational, and logical techniques to extract meaningful insights, solve problems, and guide strategic actions across diverse fields.

Demographic Information

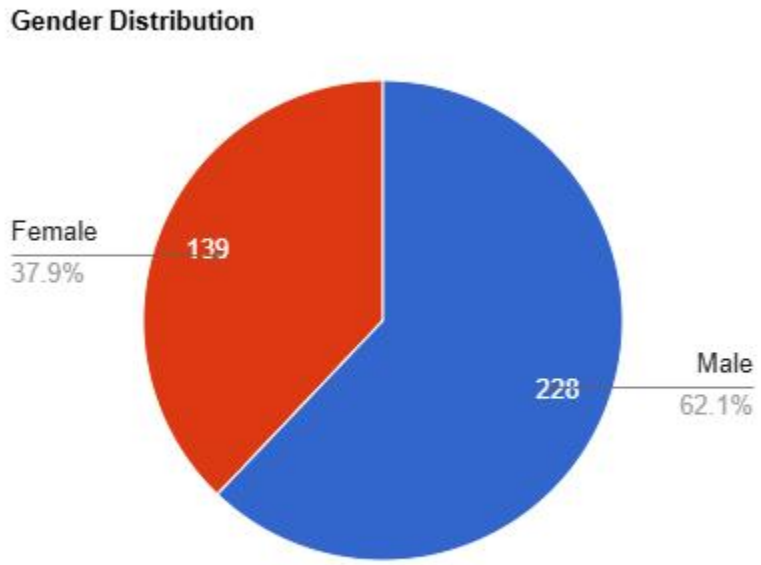

Figure No. 1 Gender wise distribution

The gender distribution indicates that male respondents form the majority of the sample, with 228 participants (62.1%), while females account for 139 participants (37.9%). This 24.2 percentage-point gap shows a noticeable gender imbalance, with men being more prominently represented. While the data still includes perspectives from both genders, the higher proportion of male respondents may influence overall

findings and should be considered when interpreting the results, particularly on issues where gendered experiences of climate change may differ.

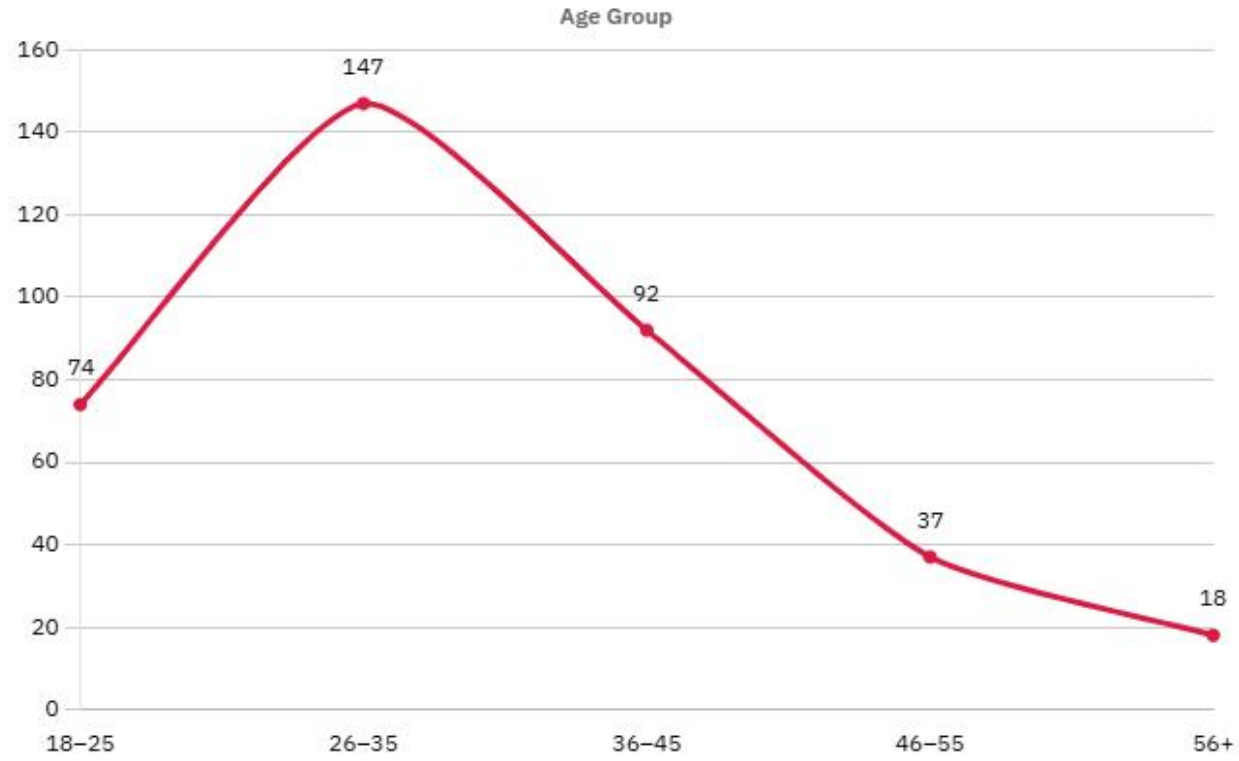

Figure No. 2 Age group wise distribution

The age distribution shows that the largest segment of respondents falls within the 26–35 age group, comprising 147 individuals (39.95%), followed by the 36–45 group with 92 participants (25.0%). Younger adults aged 18–25 represent 74 respondents (20.11%), while those aged 46–55 account for 37 participants (10.05%). The smallest proportion is observed among respondents aged 56 and above, with 18 participants (4.89%). This distribution highlights that the study primarily reflects the views of young to mid-career adults, who together make up nearly two-thirds of the sample, while older age groups are comparatively underrepresented.

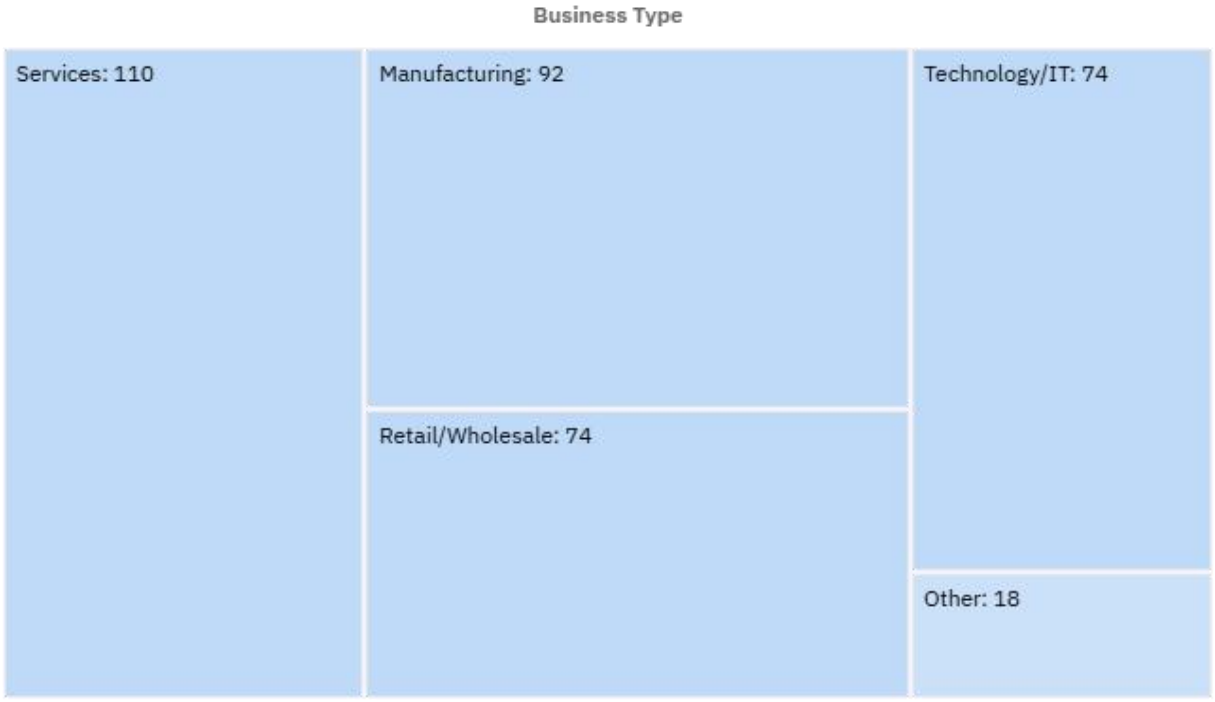

Figure No. 3 Business Type wise distribution

The distribution of business types shows a diverse representation across sectors, with services being the most common, reported by 110 respondents (29.89%). Manufacturing follows with 92 participants (25.0%), while retail/wholesale and technology/IT are equally represented, each accounting for 74 respondents (20.11%). A smaller proportion of 18 participants (4.89%) reported engagement in other types of businesses. This spread indicates that the study captures perspectives from a wide range of industries, with a stronger emphasis on the service and manufacturing sectors, while still incorporating insights from commerce and technology-related enterprises.

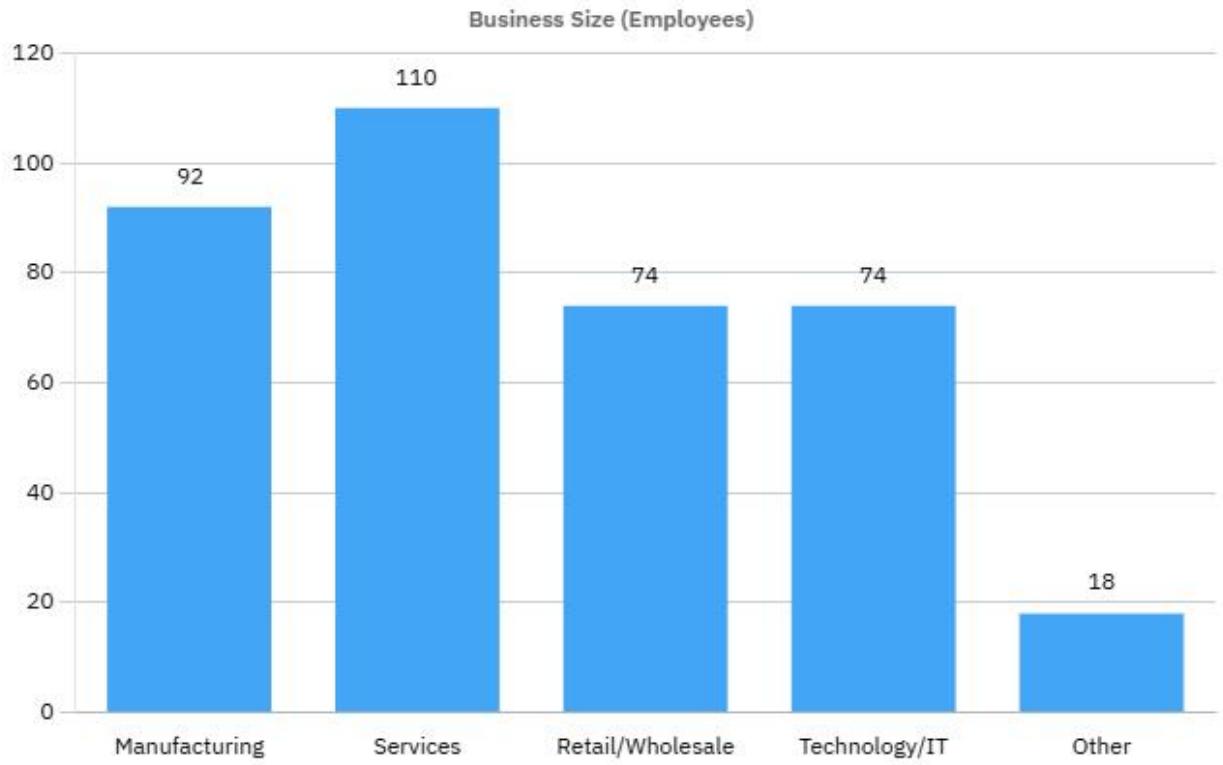

Figure No. 4 Business size wise distribution

The business size distribution illustrates a clear dominance of small and medium-sized enterprises within the sample. The largest group comprises firms with 11–50 employees, representing 129 businesses (35.05%), followed by very small firms with 1–10 employees at 95 businesses (25.82%). Medium-sized enterprises are also well represented, with 71 businesses (19.30%) employing 51–100 people and 74 businesses (19.83%) employing 101–250 people. This spread indicates a balanced representation across different business scales, with a slight concentration in the lower employee ranges, underscoring the central role of SMEs in the business landscape.

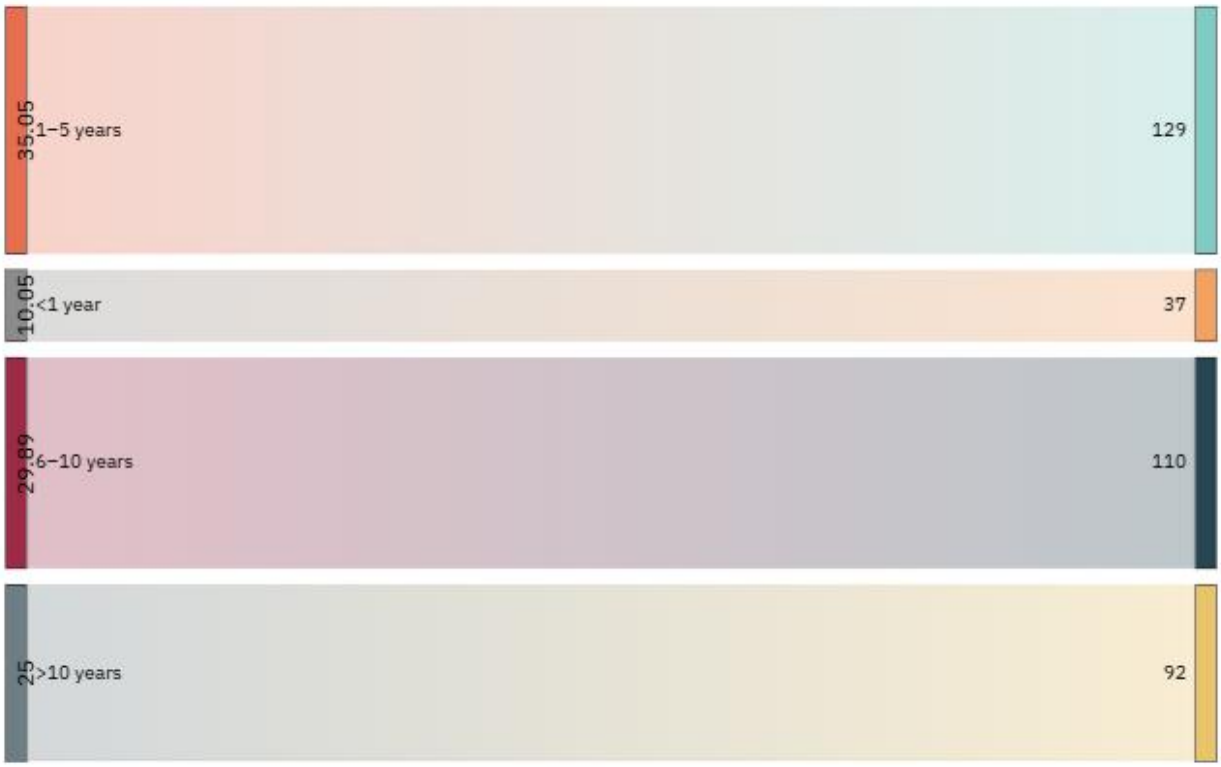

Figure No. 5 Year of Operation wise distribution

The years of operation data shows that most businesses in the sample are relatively young to mid-aged. The largest group consists of firms operating for 1–5 years, accounting for 129 respondents (35.05%), followed by businesses with 6–10 years of experience at 110 respondents (29.89%). More established firms operating for over 10 years make up 92 respondents (25.0%), while only 37 businesses (10.05%) have been in operation for less than one year. This distribution highlights that the study captures perspectives from both emerging and established enterprises, with a strong representation from firms that have developed moderate stability over time.

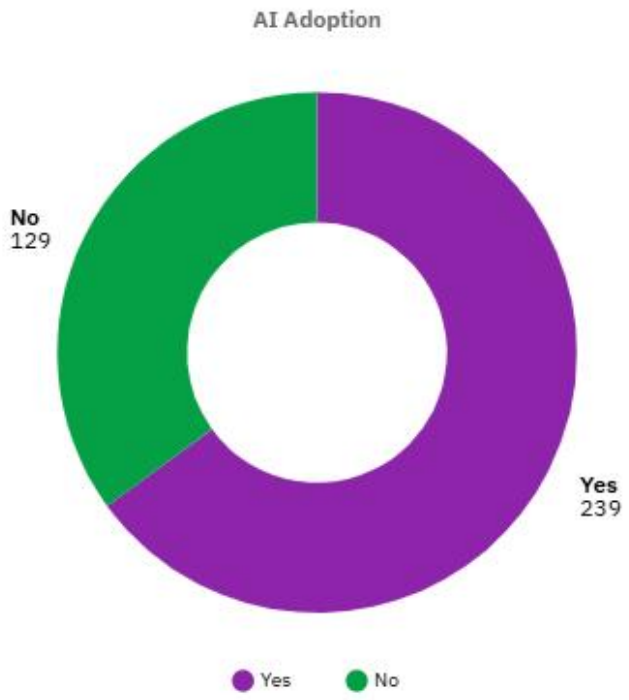

Figure No. 6 AI adoption

The data on AI adoption indicates that a majority of businesses have already integrated artificial intelligence into their operations. Out of the total respondents, 239 (64.95%) reported adopting AI, while 129 (35.05%) stated they have not. This nearly two-thirds majority suggests a strong and growing acceptance of AI technologies within the business landscape, reflecting recognition of their potential for efficiency, innovation, and competitiveness. However, the substantial minority not yet adopting AI highlights the presence of barriers such as cost, technical expertise, or awareness that may still hinder broader implementation.

Table 1: Areas of AI Adoption

Response	Frequency	Percentage
Customer Service	74	20.11%
Marketing & Sales	92	25.00%
Operations	74	20.11%
Finance	55	14.95%
HR	37	10.05%
Product Dev	37	10.05%

The data on areas of AI adoption highlights diverse applications across business functions, with some domains showing stronger uptake than others. The largest proportion of respondents reported using AI in marketing and sales (92 businesses, 25.0%), followed by customer service and operations, each adopted by 74 businesses (20.11% each). AI use in finance accounts for 55 businesses (14.95%), while human resources (HR) and product development are the least represented, with 37 businesses each (10.05%).

This distribution suggests that businesses are prioritizing AI adoption in customer-facing and process-oriented functions where efficiency and customer engagement are critical. Meanwhile, relatively lower adoption in HR and product development may reflect either early stages of integration or perceived barriers in applying AI to these areas. Overall, the trend indicates that firms are leveraging AI most where it can directly enhance competitiveness and operational performance.

Table 2: Primary Reason for AI Adoption

Response	Frequency	Percentage
Cost reduction	74	20.11%
Efficiency	110	29.89%
Decision-making	74	20.11%
Competitive Adv	74	20.11%
Customer satisfaction	37	10.05%

According to the statistics on the major motives of AI adoption, the most prominent one is efficiency, which has been mentioned by 110 businesses (29.89%). The cost reduction, decision-making support and competitive advantage were also important motivators with 74 reported (20.11) businesses each. In the meantime, 37 businesses (10.05) specified customer satisfaction as the least frequent reason on the list.
This trend indicates that companies see AI as a means to simplify operations and increase both the efficiency of their operations and at the same time consider the use of AI in cost-cutting, assisting decision-making, and enhancing competitiveness. This relatively lower customer satisfaction focus can be taken to imply that most companies are yet to focus less on customer performance benefits and more on customer-specific usability in their AI implementation contexts.

Table 3: AI Investment Level

Response	Frequency	Percentage
Very Low	37	10.05%
Low	92	25.00%
Moderate	129	35.05%
High	74	20.11%
Very High	37	10.05%

The statistics of AI investment rates show that the majority of companies invest in it at a moderate level. The highest percentage, 129 businesses (35.05) indicated a medium level of investment with a second group of 92 businesses (25.0) indicating low level of investment. Greater investments are rarer with 74 (20.11) businesses reporting high investment and 37 businesses (10.05) reporting very low and very high investment.
This trend indicates that although the use of AI is on the rise, a significant portion of the business world is hesitant and opts to make moderate or low investments instead of making serious financial investment decisions. The less significant share of the firms at the high and very high position indicates a less ambitious but still consistent approach to the AI integration, probably affected by such factors as the financial resources, technical skills, and organisational preparedness.

Table 4: Challenges in AI Adoption

Response	Frequency	Percentage
High cost	92	25.00%
Lack of skills	92	25.00%

Lack of awareness	74	20.11%
Resistance to change	55	14.95%
Security concerns	55	14.95%

The business problems of AI adoption demonstrate a combination of financial issues, technical issues, and organizational issues. The most dominant are the high cost and the absence of skills, as both were mentioned by 92 businesses (25.0%), and this is how resource and expertise limitations were identified as the key challenges. The awareness is next with 74 businesses (20.11%), or lack of knowledge that restricts informed adoption. In the meantime, 55 businesses reported resistance to change and security concerns each (14.95%), which showed the presence of cultural and trust-related barriers.
On the whole, the results indicate that, although organizations acknowledge the importance of AI, the prevalent use is not achieved due to the cost factor and lack of qualified staff. These problems can be mitigated through awareness campaigns, training of workforce, and improved security structures, which would help increase the adoption of AI in business operations.

Table 5: Productivity Change

Response	Frequency	Percentage
Decreased significantly	7	1.90%
Decreased slightly	18	4.89%
No change	66	17.93%
Increased slightly	147	39.95%
Increased significantly	129	35.05%

The productivity change data shows that the adoption of AI has a significant positive influence in general. Three-quarters of the respondents (75) reported positive changes, 147 businesses (39.95) registered a marginal rise and 129 businesses (35.05) a significant rise in productivity. On the other hand, 66 businesses (17.93%) did not change, whereas a very few experienced some decreases, 18 businesses (4.89) slight and 7 businesses (1.90) significant.

These results indicate that AI adoption has generally enhanced business productivity, with only limited instances of negative outcomes. The strong positive trend underscores AI's potential to drive efficiency and performance gains, though the small proportion reporting declines suggests that challenges such as improper implementation, inadequate skills, or mismatched applications may affect outcomes in certain cases.

Table 6: Revenue Growth

Response	Frequency	Percentage
Significant	92	25.00%
Moderate	110	29.89%
Slight	74	20.11%
No impact	74	20.11%
Negative	18	4.89%

The data on revenue growth shows that most businesses adopting AI have experienced positive financial outcomes. The largest group, 110 businesses (29.89%), reported moderate growth, while 92 businesses (25.0%) indicated significant growth. A further 74 businesses each (20.11%) observed slight growth or no

impact, reflecting mixed results for some firms. Only a small minority, 18 businesses (4.89%), reported a negative impact on revenue.

Overall, the findings suggest that AI adoption tends to support revenue enhancement, with more than 75% of businesses reporting growth at varying levels. However, the presence of "no impact" and negative outcomes highlights that benefits are not uniform and may depend on factors such as industry type, implementation strategy, and resource allocation.

Table 7: AI's Contribution to Pakistan's Economy

Response	Frequency	Percentage
Strongly Disagree	18	4.89%
Disagree	37	10.05%
Neutral	74	20.11%
Agree	147	39.95%
Strongly Agree	92	25.00%

The data on AI's contribution to Pakistan's economy reflects an overall positive perception among respondents. A majority, 239 businesses (64.95%), either agree (39.95%) or strongly agree (25.0%) that AI plays a significant role in contributing to the national economy. Meanwhile, 74 respondents (20.11%) remained neutral, indicating some uncertainty or limited direct exposure to AI's broader economic impact. A smaller segment expressed disagreement, with 37 respondents (10.05%) disagreeing and 18 respondents (4.89%) strongly disagreeing.

These findings suggest that while there is strong confidence in AI's potential to drive economic growth in Pakistan, a notable portion of respondents remain cautious or unconvinced, likely due to challenges in adoption, uneven benefits across sectors, or lack of widespread integration at the national level.

Table 8: Recommendation for AI Adoption

Response	Frequency	Percentage
Definitely Yes	147	39.95%
Probably Yes	110	29.89%
Not sure	55	14.95%
Probably Not	37	10.05%
Definitely Not	18	4.89%

The data on recommendations for AI adoption reveals a strong inclination toward encouraging its use in businesses. The majority of respondents expressed support, with 147 (39.95%) stating "Definitely Yes" and 110 (29.89%) selecting "Probably Yes", together accounting for nearly 70% of the sample. A smaller proportion, 55 respondents (14.95%), were uncertain, while only 37 (10.05%) indicated "Probably Not" and 18 (4.89%) expressed "Definitely Not."

This distribution highlights a predominantly positive outlook on AI adoption, with most participants recognizing its potential benefits for business growth and competitiveness. However, the presence of hesitant and negative responses indicates that concerns related to cost, skills, or security still need to be addressed to achieve broader acceptance and implementation.

DISCUSSION

This research indicates that the adoption of Artificial Intelligence (AI) by Small and Medium Enterprises (SMEs) in Pakistan is a growing trend, and almost two-thirds (65% of the surveyed businesses) of the businesses state they use AI technologies. It means that the SMEs of Pakistan are becoming more aware of the transformational potential of AI to improve efficiency, competitiveness, and business performance in general. The demographical analysis shows that most business owners and managers are located in the 2635 age category, which indicates that younger business owners are more open to changes in technologies. Also, they majority of the respondents had a bachelor or master degree and it means that the awareness and acceptance of AI solutions may be enhanced by higher levels of education.

Business type wise, service based businesses took the highest percentage of AI adopters, then manufacturing and retail industries. This is indicative of the general trend on the global stage which shows service sectors, especially those that are customer service, marketing, and operations, embracing AI early because it has lower entry barriers than manufacturing processes that are capital intensive. In line with this, marketing and sales turned out to be the most widespread sphere of AI application, as SMEs paid particular attention to the idea of using AI-driven insights in order to improve customer interaction and increase the market reach.

The beneficial effect of AI adoption was already reflected in the economy, as almost three-quarters of the participants admitted that productivity increased, and over half of them mentioned that revenue was growing moderately or significantly. These results are consistent with other studies carried out internationally that show that the implementation of AI ensures cost savings, better decisions, and competitiveness. Nevertheless, the problems of high implementation costs, shortage of skilled workers, and poor awareness are still a major obstacle to SMEs. It is worth noting that the problems of cost and workforce skills were mentioned as the main challenges as well, which indicates the necessity to implement the supportive policies and training programs and fill the gaps.

Positively, most respondents had a strong belief that the use of AI by SMEs is a positive aspect towards the economic growth of Pakistan. This notion can be supported by the observation that about 70 percent of the respondents advised the use of AI to their colleagues. These perceptions signify that more people are optimistic that AI can enhance sustainable growth and innovation within the Pakistani SME sector. Nevertheless, a minor part of businesses did not report any effects or very low effects on the productivity and revenues, which suggests that the advantages of AI use are not evenly distributed and can be relative to the sphere, investment scale, and implementation plan.

In general, the discussion points to the duality of AI implementation in SMEs because it may provide significant opportunities to enhance the performance of the business and become a participant of the creation of the national level; however, the structural issues are to be addressed.The academic institutions, policymakers and industry associations should join hands in offering financial assistance, technical training and awareness to SMEs. This would not only improve the performance of individual firms but would also make the sector of SMEs in Pakistan a major force toward the economic modernization in times of digitalization.

CONCLUSION AND RECOMMENDATIONS

The aim of the paper was to discuss the application of Artificial Intelligence (AI) to the Small and Medium Enterprise (SMEs) in Pakistan, as well as what this has on the economy of the country overall. The observations indicate that AI adoption is gradually picking up among a younger and better educated cohort of entrepreneurs who are ready to adopt technological transformation to cement the competitive advantage. The first to adopt AI solutions seem to be the services sector and, most evidently, SMEs that

engage in marketing and communication with customers. It also demonstrates that the use of AI has been characterized by enhancement of productivity, operation efficiency and revenues in a majority of enterprises, a fact that justifies its radical innovation of the SME sector. However, in the analysis, it has also been established that there are several challenges such as high implementation cost, untrained professionals and awareness that is impeding its extensive implementation. These results support the notion that although AI can play a significant role in supporting the economic modernization in Pakistan, structural barriers need to be resolved to reflect benefits in all sectors.

In accordance with the insights obtained, it is possible to make several suggestions to speed up the implementation of AI in SMEs. To alleviate the financial burden on integration of AI, first, the policymakers need to develop enabling policies and offer monetary incentives in the form of subsidies, low rate loans, or tax exemptions. This would motivate more of the SMEs especially the ones that have less capital to invest in digital technologies. Second, the urgent necessity to develop human capital using special training courses, workshops, and academic-industrial partnerships to provide the workforce with skills in AI-related matters is present. Colleges, educational institutions, and government training centers could be instrumental in the establishment of a pool of professionals who can be engaged in the changes in SMEs that are AI-driven. Third, awareness and knowledge-sharing environments must be created to promote the knowledge of the opportunities and real-world uses of AI, especially among business owners that have limited access to innovative technologies. Fourth, the collaboration between the private sector, government agencies, and international organizations can be encouraged to facilitate the transfer of technologies, collaborate on research, and share resources so that SMEs will not be left out in the international digital game.

To sum up, the implementation of AI in the SME industry of Pakistan is both a challenge and an opportunity. With the policy-enabling policies adopted and supported by the AI, it can enhance business performance significantly and support innovation and the continuing economic growth. The SMEs can eliminate the financial, technical and awareness related barriers to become active agents of change in transforming the Pakistani economy in the digitalisation times. Finally, the paper indicates that AI adoption is not only a change of technology, but also a necessity of having a robust competitive, and future-proof SME sector in Pakistan.

REFERENCES

Afshar, M. Z., & Shah, M. H. (2025). A Narrative Review for Revisiting BCG Matrix Application in Performance Evaluation of Public Sector Entities. *The Journal of Research Review*, *2*(02), 325-337.

Afshar, M. Z., & Shah, M. H. (2025). Examining Vision Sharing as a Driver of Organizational Resilience: Evidence from Public Sector Contexts in Developing Economies. *Indus Journal of Social Sciences*, *3*(2), 971-985.

Ahmad, S., & Museera, S. (2024). The Strategic Influence of Cloud Computing on Contemporary Marketing and Management Practices. *Journal of Engineering and Computational Intelligence Review*, *2*(2), 21-30.

Ahmed, M. U. (2025). Investigating The Barriers To Digitalization And Ai Adoption Among Small Retailers In Pakistan: A Toe Framework Perspective. *Pakistan Journal of Social Science Review*, *4*(4), 684-708.

Alam, S., Hamayun, K., & Khan, I. (2025). Digital Transformation of Fashion Entrepreneurship in Pakistan: AI Adoption, Social-Commerce Capability, and Financial Inclusion. *Policy Journal of Social Science Review*, *3*(9), 180-195.

Ali, Z. A., Zain, M., Pathan, M. S., & Mooney, P. (2024). Contributions of artificial intelligence for circular economy transition leading toward sustainability: An explorative study in agriculture and food industries of Pakistan. *Environment, Development and Sustainability*, *26*(8), 19131-19175.

Alim, I., Imtiaz, N., Al Prince, A., & Hasan, M. A. (2025). AI and Blockchain Integration: Driving Strategic Business Advancements in the Intelligent Era. *Journal of Engineering and Computational Intelligence Review*, *3*(2), 38-50.

Arif, S. R., Bhatti, M. U., Ali, M., & Malik, A. M. (2024). Impact Of Digital Economy on Pakistan's Economic Growth. *Pakistan Research Journal of Social Sciences*, *3*(4).

Arshad, M. Z., Khan, W., Arshad, M., Ali, M. A. J. I. D., Shahdan, A., & Ishak, W. (2020). Importance and challenges of SMEs: A case of Pakistani SMEs. *Journal of Research on the Lepidoptera*, *51*(1), 701-707.

Ashfaq, K., Abbas, N., Akram, A., & Shahazdi, I. (2025). The Strategic Impact Of Artificial Intelligence On Business Innovation And Firm Performance: A Resource-Based View Approach. *Journal of Management & Social Science*, *2*(4), 868-891.

Atif, M. (2024). The Transformative Role of Block chain Technology in Supply Chain Management. *Journal of Engineering and Computational Intelligence Review*, *2*(2), 31-44.

Atif, M., Altaf, Y., Gul, S., & ul Hassan, S. W. (2024). Impact Of Innovation On Pakistan's Gdp: The Mediating Role Of Sme Growth. *Journal of Research in Economics and Finance Management*, *3*(2), 55-67.

Butt, S., & Yazdani, N. (2023). Implementation of Quality Management Practices and Firm's Innovation Performance: Mediation of Knowledge Creation Processes and Moderating role of Digital Transformation. *Pakistan Journal of Humanities and Social Sciences*, *11*(4), 3881-3902.

Cooper, R. G. (2025). SMEs' use of AI for new product development: Adoption rates by application and readiness-to-adopt. *Industrial Marketing Management*, *126*, 159-167.

Fahad, S., Alnori, F., Su, F., & Deng, J. (2022). Adoption of green innovation practices in SMEs sector: evidence from an emerging economy. *Economic research-Ekonomska istraživanja*, *35*(1), 5486-5501.

Farooq, M. W., Nawaz, F., & Sabir, R. I. (2024). To Gain Sustainable Competitive Advantages (SCA) Using Artificial Intelligence (AI) Over Competitors. *Bulletin of Business and Economics (BBE)*, *13*(2), 1026-1033.

Fauz, F., Baloch, S. K., Al Prince, A., Raza, A., & Alim, I. (2025). Enhancing Power System Stability Through The Implementation Of Advanced Control Strategies. *Spectrum of Engineering Sciences*, *3*(8), 307-329.

Gillani, S. A., Alvi, A. R., Ahmad, H., Gillani, S. A., & Tanveer, Y. (2025). FinTech Adoption for SMEs: Innovation and Opportunities Worldwide. In *Algorithmic Training, Future Markets, and Big Data for Finance Digitalization* (pp. 105-120). IGI Global Scientific Publishing.

Hafeez, M., & Sharif, I. (2025). From Digital Transformation to Innovation: The Sequential Role of Agility and AI Adoption in Pakistan's Telecom and Manufacturing Sectors. *The Critical Review of Social Sciences Studies*, *3*(3), 1468-1484.

Hanif, R. A. (2024). Impact of AI in Labor Market of Pakistan and Developing Countries. *Insights of Pakistan, Iran and the Caucasus Studies*, *3*(4), 56-66.

Hasan, M. A., Mazumder, M. T. R., Motari, M. C., Shourov, M. S. H., & Howlader, M. J. (2025). Assessing AI-enabled fraud detection and business intelligence dashboards for trust and ROI in U.S. e-commerce: A data-driven study. AVE Trends in Intelligent Technoprise Letters, 2(1), 1–14. https://doi.org/10.64091/ATITP.2025.000106

Hassan, N. M., Khan, S. A. R., Ashraf, M. U., & Sheikh, A. A. (2023). Interconnection between the role of blockchain technologies, supply chain integration, and circular economy: A case of small and medium-sized enterprises in Pakistan. *Science Progress*, *106*(3), 00368504231186527.

Hussain, A., & Rizwan, R. (2024). The Case for an Industrial Policy Approach to AI Sector of Pakistan for Growth and Autonomy. *arXiv preprint arXiv:2411.01337*.

Ilyas, M., & Ilyas, R. (2024). The Role of Quantum Computing in Future Big Data Processing: A Comprehensive Review. *Journal of Engineering and Computational Intelligence Review*, *2*(1), 9-17.

Iram, T., Albadry, O., Mehmood, S., & Ahmad, Z. (2025). Driving success for women entrepreneurs in KSA by leveraging AI and agility: insights from the theory of technology dominance (TTD). *Management & Sustainability: An Arab Review*.

Jalil, M. F., Lynch, P., Marikan, D. A. B. A., & Isa, A. H. B. M. (2025). The influential role of artificial intelligence (AI) adoption in digital value creation for small and medium enterprises (SMEs): does technological orientation mediate this relationship?. *AI & SOCIETY*, *40*(3), 1875-1896.

Jamil, K., Zhang, W., Anwar, A., & Mustafa, S. (2025). Exploring the Influence of AI Adoption and Technological Readiness on Sustainable Performance in Pakistani Export Sector Manufacturing Small and Medium-Sized Enterprises. *Sustainability*, *17*(8), 3599.

Khan, A. N., Mehmood, K., & Soomro, M. A. (2024). Knowledge management-based artificial intelligence (AI) adoption in construction SMEs: the moderating role of knowledge integration. *IEEE transactions on engineering management*, *71*, 10874-10884.

Khan, M. A. (2023). Role of Artificial Intelligence in Construction Industry of Pakistan. *International Journal of Advanced Engineering, Management and Science*, *9*, 12.

Khan, S. A. R., Sheikh, A. A., Shamsi, I. R. A., & Yu, Z. (2025). The implications of artificial intelligence for small and medium-sized enterprises' sustainable development in the areas of blockchain technology, supply chain resilience, and closed-loop supply chains. *Sustainability*, *17*(1), 334.

Lai, M. K., May, A. Y. C., Tay, L. C., & Lim, K. G. (2025). Re-examining AI Adoption Antecedents and Its Potential Effect on AI Sustained Use in Small and Medium Enterprises (SMEs). *PaperASIA*, *41*(1b), 292-305.

Madanchian, M., Hussein, N., Noordin, F., & Taherdoost, H. (2015). The role of SMEs in economic development: Case study of Malaysia. *International Journal of Academic Research in Management*, *4*(3), 77-84.

Majeed, M. I., Yousaf, S., Tariq, A., & Javed, H. M. I. (2025). The Role Of Artificial Intelligence And Adaptive Capabilities In Enhancing Supply Chain Resilience, Performance, And Financial Outcomes In Pakistan's Textile Sector. *Center for Management Science Research*, *3*(3), 888-908.

Manzoor, F., Wei, L., & Siraj, M. (2021). Small and medium-sized enterprises and economic growth in Pakistan: An ARDL bounds cointegration approach. *Heliyon*, *7*(2).

Nazir, M. A., Roomi, M. A., & Khan, M. R. (2022). Challenges of E-commerce adoption experienced by Pakistani SMEs: a qualitative analysis. *International Review of Entrepreneurship*, *20*(3), 447-476.

Pathan, Z. H., Jianqiu, Z., Akram, U., Khan, M. K., Latif, Z., & Tunio, M. Z. (2017). Innovation-diffusion determinants of cloud-computing adoption by Pakistani SMEs. *Human Systems Management*, *36*(3), 197-209.

Ramish, M. S., Yasir, M., & Nazim, Z. (2025). Impact of Artificial Intelligence on the Business Decisions: A Qualitative Perspective. *Journal of Development and Social Sciences*, *6*(3), 414-422.

Raza, D. A., Matloob, D. S., Shah, D. M. H., & Sarki, D. I. H. (2023). Leadership styles and sustainable competitive performance in Pakistani smes: an industry 4.0 perspective. *Bulletin of Business and Economics (BBE)*, *12*(3), 138-149.

Sadia, B. U. T. T. (2020). Service quality assessment and student satisfaction in business schools: Mediating role of perceived value. *MOJEM: Malaysian Online Journal of Educational Management*, *9*(1), 58-76.

Saleem, I., Hoque, S. M. S., Tashfeen, R., & Weller, M. (2023). The interplay of AI adoption, IoT edge, and adaptive resilience to explain digital innovation: evidence from German family-owned SMEs. *Journal of Theoretical and Applied Electronic Commerce Research*, *18*(3), 1419-1430.

Shahzad, M. H., Rafy, T., Malik, A., Waqar, M., & Ahmad, S. (2025). The Rise of Autonomous Enterprises: How AI is Reshaping Business Models and Market Dynamics. *ACADEMIA International Journal for Social Sciences*, *4*(2), 677-693.

Soomro, R. B., Memon, S. G., Dahri, N. A., Al-Rahmi, W. M., Aldriwish, K., A. Salameh, A., ... & Saleem, A. (2024). The adoption of digital technologies by small and medium-sized enterprises for sustainability and value creation in Pakistan: The application of a two-staged hybrid SEM-ANN approach. *Sustainability*, *16*(17), 7351.

Ullah, A., & Khan, S. D. (2024). Impact of sound decision-making on small and medium businesses in Pakistan. *International Journal of Asian Business and Management*, *3*(2), 177-192.

Ullah, I., Khan, M., Rakhmonov, D. A., Bakhritdinovich, K. M., Jacquemod, J., & Bae, J. (2023). Factors affecting digital marketing adoption in Pakistani small and medium enterprises. *Logistics*, *7*(3), 41.

Umer, W., Furnaz, R., Sadiq, B., Bashir, T., & Naseem, A. (2024, October). Study on the Impact of AI-Powered GHRM Practices on Employee Behavior and Organizational Performance: Evidence from SMEs of Pakistan. In *2024 Horizons of Information Technology and Engineering (HITE)* (pp. 1-5). IEEE.

Wei, R., & Pardo, C. (2022). Artificial intelligence and SMEs: How can B2B SMEs leverage AI platforms to integrate AI technologies?. *Industrial Marketing Management*, *107*, 466-483.