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The Role of Artificial Intelligence Practices in Organizational Productivity with the mediating role of Artificial Intelligence Integration Effectiveness in the FMCG sector of Pakistan

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ABSTRACT

Artificial intelligence (AI) and other advanced technologies are increasingly recognized as essential catalysts for enhancing productivity due to their capability to transform nearly all operations within and outside firms. This study examines the Impact of Artificial intelligence (AI) practices on organizational productivity with the mediating role of artificial intelligence effectiveness in the FMCG sector of Pakistan. Primary data has been collected through a structured questionnaire from the FMCG sector of Pakistan. 180 current employees in the FMCG sector in Pakistan participated in the study. A convenience sampling technique was used to collect the primary data. Each question had five options; each of them was assigned a value from one to five. Rating "one" was strongly disagree and "five" was strongly agree. A questionnaire for this has been adopted from a past study. SPSS 17 has been used for statistical calculations. Results indicate that in the FMCG sector in Pakistan, artificial intelligence (AI) practices have a significant positive influence on organizational productivity. It is also concluded that organizational productivity is said to be mediated by artificial intelligence effectiveness. It is recommended that FMCG organizations are concerned, should completely understand the significance of artificial intelligence (AI) practices, so as to improve organizational productivity.
Keywords: Artificial intelligence practices, artificial intelligence effectiveness, organizational productivity

INTRODUCTION

Industrialization can be considered an important factor in manufacturing as it relates to production. A variety of organizations, which have not adopted artificial intelligence, faced major challenges to their ongoing strategies for sustaining today (Ali et al., 2025). Competition is becoming intense in any form of business activities in all sectors and industries, and a shared vision of possible scenarios and being committed to preventing the occurrence of different incidents (Zhang, 2024).

Industries are adopting Industry these developments are driven by technological advancements, especially the emergence of the Fourth Industrial Revolution. Due to opportunities that made it possible to produce quality products (Al Lawati et al., 2024). However, regardless of all the above benefits associated with the shift to artificial intelligence. In the extent of excessive and excessive exploitation of resources, materials, information, and environmental information. However, there is a disagreement among some researchers who argue that sustainability is viewed as a subordinate question under the concept of the fourth industrial revolution. The growth of the fourth industrial revolution (Dubey, 2021).

Enabling it to occur through the use of artificial intelligence. As mentioned earlier, the main focus of the initiative was to have the potential to improve the general efficiency levels of production operations. IT, digitization, and Internet promise an opportunity for the process of exchanging information and data that takes place between humans and machines. Acting, communication, and possible triggering of supply chain members, consumers, and other relevant parties. Actors inside the manufacturing systems in the manufacturing system (Ford, 2022).

The implementation of artificial intelligence is expected to produce several advantages, such as the ability for greater customization through increased flexibility within the manufacturing process. Allow enterprises to produce individual goods, and at the same time, reduce the time taken. Needed to bring them to the market. Also, it is stated that this effort has the ability to increase production, reduce resource consumption, improve quality, and optimize. The concept of circular economy is also supported by artificial intelligence (Almada, 2020).

The Fast-Moving Consumer Goods (FMCG) industry in the context of Pakistan is critical in the development of the economy and the creation of jobs. Nonetheless, the literature of empirical studies investigating the role of artificial intelligence practices in organizational productivity in this industry is limited. More to the point, the current research has not paid much attention to the effectiveness of artificial intelligence integration in the translation of AI practices into actual productivity results. The adoption of AI tools might not be enough unless the organizations can successfully incorporate these technologies into their operations and management activities.

Thus, this research will empirically investigate how artificial intelligence practices can contribute to improving the productivity of organizations, especially the mediating effect of artificial intelligence integration effectiveness in the FMCG industry of Pakistan. In filling this gap, the study aims to add to the increasing amount of literature on AI-based organizational performance in emerging economies and offer practical implications to managers and policymakers.

Based on these research questions, the objectives of the studies are as follows.

- To determine the impact of artificial intelligence practices on organizational productivity in the FMCG sector of Pakistan.
- To investigate the influence of AI tools awareness on organizational productivity in the FMCG sector of Pakistan.

- To analyze the influence of AI tools & resources availability on organizational productivity in the FMCG sector of Pakistan.
- To find out the mediating role of artificial intelligence integration effectiveness between artificial intelligence practices on organizational productivity in the FMCG sector of Pakistan.
- To give suggestions to enhance sustainable performance in the manufacturing sector of Pakistan.

LITERATURE REVIEW

The word AI consists of the words "artificial" and "intelligence". The word "artificial" is something that is not real, simulated, but not completely false regarding being a fraud. While "intelligence" is something that can replace genuine items because the former has better qualities in a certain context. Intelligence is a very complex term. It includes different forms, such as reasoning, self-knowledge, understanding, emotional awareness, preparation, consciousness, and creativity (Ahmet, 2023).

The concept of artificial intelligence has become a central element of organisational change, especially when it comes to the improvement of productivity and the maximisation of operational efficiency. In various industries, organisations are embracing the use of AI-based tools to automate processes, optimise decision-making, and improve overall performance (Ansari et al., 2020). Previously conducted empirical studies suggest that artificial intelligence can supply companies with the ability to process a large amount of data, reduce the number of mistakes made by humans, and better maximize the use of resources, which positively affects the productivity of the organisation (Kardinal et al., 2023; Madureira et al., 2022).

Artificial intelligence practices refer to the level at which organizations adopt and use AI-based tools, systems, and resources in their operations and management processes (Ashraf, Khan & Mahmood, 2025). These practices involve the knowledge of AI technologies among the employees, the presence of AI-related resources, as well as the organisational preparedness to embrace the intelligent systems. Researchers argue that AI practices do not only consist of the use of technology, but also include the organisational capacity to understand, implement, and regulate AI in a proficient way (Rahman et al., 2022). Organisations will be in a better position to use AI tools and thus increase efficiency and productivity when employees have adequate knowledge of the tools and their uses (Warschauer, 2021).

Empirical research has continued to point out the importance of AI tool awareness in supplementing organisational performance. The understanding of AI systems by employees promotes successful use of intelligent technologies, lessens technological change resistance, and enhances task performance. Chen and Day (2020) point out that realisation and acquaintance with AI systems will enable organisations to maximize the advantages of computational intelligence, especially in multifaceted operating settings. In the same manner, Chatterjee et al. (2022) states that AI awareness improves the ability to solve problems and facilitate data-driven

decision-making, which later leads to increased productivity (Iqbal, Shah & Abid, 2025).

Besides awareness, AI tools and resources are critical in influencing the success of AI practices. Companies investing in developed AI infrastructure, human resources, and supporting technologies have higher chances of gaining performance. According to Bharadiya (2023), AI-based business processes increase the speed, accuracy, and consistency of operations, which directly affect the productivity of organisations. In the absence of sufficient resources, though, AI implementation is a shallow affair that does not provide significant performance gains (Janjua, Qureshi & Shah, 2025).

Whereas previous literature proves the beneficial effect of AI practices on the performance of organisations, recent studies indicate that the availability of AI technologies is not enough to ensure productivity improvements (Kanwal & Tasleem, 2025; Uddin, Hussain, Ali, 2025). The success rate at which the AI systems can be incorporated into the current organisational processes is a very important aspect in the realisation of the full potential of the AI systems. AI integration effectiveness is the extent of artificial intelligence technologies that are integrated into organisational processes, business strategies, and organisational structures and capabilities (Castka et al., 2020; Khatoon et al., 2023).

With proper integration of AI, smooth coordination between human and machine intelligence can be achieved, information flow will be enhanced, and decision-making processes will be improved at all levels of the organisation. According to Ford et al. (2022), the key to successful AI integration is to synchronise the technological potential with organisational processes and be able to adjust to the evolving business environment. Companies that successfully implement AI technologies are more likely to react to the changes in the market, enhance supply chain management, and achieve better productivity results (Naseer, Haq, & Shah, 2025).

The emerging empirical data also suggests that the effectiveness of AI integration is a mechanism through that AI practices can affect organizational performance (Shabbir et al., 2021). Liu et al. (2024) show that IT and AI capabilities can add value to the performance of firms through the improved absorptive capacity and operational agility in an indirect way. This implies that the effectiveness of AI integration is a mediating factor between AI practices and real productivity improvements. Equally, Dobey et al. (2022) note that AI-driven systems can enhance the performance of organisations only in the presence of successful integration and managerial dedication.

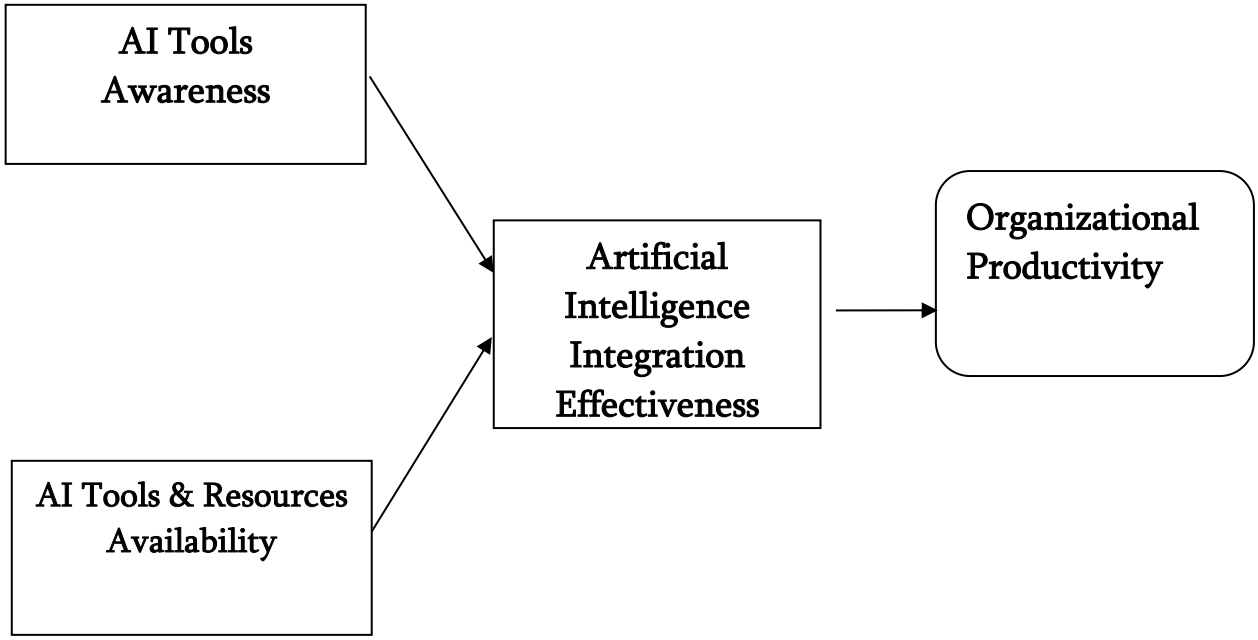
In the framework of the developing economies, including Pakistan, the connection between AI practices and organisational productivity is not studied thoroughly, especially in the fast-moving consumer goods (FMCG) segment. The FMCG sector is a very competitive one with high volume production, low margins, and fast shifting consumer tastes. In this area, artificial intelligence presents a big prospect of enhancing the accuracy of forecasts, inventory control, and efficiency in

production (Sib-e-Ali et al., 2021). However, there is a dearth of empirical studies that have investigated the combined effect of AI practices and integration effectiveness on the productivity outcomes in FMCG organisations in Pakistan.

Furthermore, there is still a fear of job displacement and an unwillingness to adopt AI, especially in emerging markets. As much as AI is viewed as a threat to employment, some studies believe that AI does not fully substitute human labour, but it complements it, making it more efficient (Madureira et al., 2022; Taqi, Mohsin, & Khan, 2022). Companies that invest in training and develop AI-related skills have greater chances of enjoying the benefits of human-AI cooperation and sustainability in productivity.

According to the literature available, it is clear that artificial intelligence practices have a positive effect on the productivity of organisations. Nonetheless, the success of AI integration is an important factor to consider when assessing how these practices can be converted into performance improvements. Although the topic of AI-driven productivity gains more and more attention, there is little empirical evidence on the mediating factor of AI integration effectiveness, especially in the FMCG sector in Pakistan. To fill this gap, the current research paper will focus on the immediate effect of artificial intelligence practice on organizational productivity and explore the mediating effect of the effectiveness of artificial intelligence integration in the FMCG environment.

Conceptual framework



According to this conceptualization and the literature that has been reviewed, the following hypotheses are put forward:

H1: Artificial intelligence tools awareness has a significant positive impact on organizational productivity.

H2: AI tools & resources availability has a significant positive impact on organizational productivity.

H3: Artificial intelligence integration effectiveness mediates the relationship between artificial intelligence practices and organizational productivity.

METHODOLOGY

The research design adopted in this study was a quantitative research design to empirically investigate the relationship between artificial intelligence practices and organizational productivity, with the mediating factor of artificial intelligence integration effectiveness in the FMCG sector of Pakistan. The survey-based method was used because it enables one to gather standardized data about a comparatively significant number of respondents and test hypothesized relationships statistically. Quantitative approach was deemed suitable since it offers measurable, objective and generalizable outcomes, which are necessary in making strong inferences about organizational phenomena.

The study population was the professionals in the FMCG sector of Pakistan who were presumed to be exposed and knowledgeable enough on the practice of artificial intelligence in their organizations. A sample of 180 employees who were representatives of different FMCG organizations in Pakistan was used to collect data. The sample used in the study was diverse and representative, as both male and female respondents participated in it, with different ages, education, and professional experiences. The data were collected using a non-probability convenience sampling method because of the limitations of accessibility and time. This method helped the researcher gather the responses of the participants who were easily accessible and ready to join the study, which is a common practice in organizational and management research.

The structured questionnaire was used to gather primary data based on the previous empirical research to allow content validity and significance. The questionnaire contained closed-ended questions with a five-point Likert scale where the answers were 1 (strongly disagree) to 5 (strongly agree). The tool contained questions that assessed the awareness of artificial intelligence tools, the availability of AI tools and resources, the effectiveness of artificial intelligence integration, and organizational productivity. The reliability and credibility of the instrument increased because of the use of measurement scales that were previously tested and validated.

The data obtained were analyzed with the Statistical Package of Social Sciences (SPSS), version 23. The demographic characteristics of the respondents were analyzed using descriptive statistics of frequencies and percentages. Cronbach's alpha was used to evaluate the internal consistency of the measurement scales, and the values were found to be above the recommended value of 0.70, which means that there is good reliability. The strength of the relationships and the direction of the relationships between the study variables were analyzed through Pearson correlation analysis. The direct impact of the artificial intelligence practices on the organizational productivity was tested by the use of the multiple regression analysis, and the mediation analysis was conducted according to the Baron and Kenny

strategy to determine the mediating role of the effectiveness of artificial intelligence integration. Such statistical methods made it possible to give a thorough analysis of both direct and indirect relationships.

RESULTS AND DATA ANALYSIS

The section presents the empirical results of the study using the results of the data gathered on 180 employees operating in the FMCG industry of Pakistan. Statistical Package of Social Sciences (SPSS), version 23, was used to analyse the data. The analysis will include the demographic features of the respondents, reliability analysis of the measurement scales, correlation analysis, multiple regression analysis and mediation analysis according to the proposed conceptual framework and hypotheses.

Demographic Profile of Respondents

The demographic profile of the respondents, such as gender, age, education, and work experience, was summarized using descriptive statistics. The findings demonstrate that the sample is a very diverse group of FMCG professionals with different demographic and professional backgrounds.

Table 1

Demographic Characteristics of Respondents (N = 180)

Demographic Variable	Category	Frequency	Percentage
Gender	Male	112	62.2%
	Female	68	37.8%
Age	20–30 years	54	30.0%
	31–40 years	78	43.3%
	41–50 years	36	20.0%
	Above 50 years	12	6.7%
Education	Bachelor	61	33.9%
	Master	89	49.4%
	MS/PhD	30	16.7%
Experience	Less than 5 years	48	26.7%
	5–10 years	79	43.9%
	More than 10 years	53	29.4%

Overall, the demographic structure indicates that the respondents are adequately educated and experienced in their line of work to give valid answers concerning the use of artificial intelligence and its impact on organisational productivity in the FMCG industry.

Reliability Analysis

Cronbach's alpha was used to measure the internal consistency of the

measurement scales. As indicated in Table 2, all the constructs have a Cronbach's alpha that is higher than the recommended 0.70, which means that the instrument has good reliability and internal consistency.

Table 2

Reliability Statistics

Construct	No. of Items	Cronbach's Alpha
AI Tools Awareness	5	0.881
AI Tools & Resources Availability	5	0.873
AI Integration Effectiveness	6	0.892
Organizational Productivity	6	0.905
Overall Scale	22	**0.921**

These findings prove that the measurement scales employed in the research are valid and can be used in further statistical analysis.

Correlation Analysis

The Pearson correlation analysis was done to investigate the strength and direction of association between artificial intelligence tools awareness, AI tools and resources availability, AI integration effectiveness, and organizational productivity. Table 3 shows the correlation coefficients.

Table 3

Pearson Correlation Matrix (N = 180)

Variables	1	2	3	4
1. AI Tools Awareness	1			
2. AI Tools & Resources Availability	.48**	1		
3. AI Integration Effectiveness	.55**	.51**	1	
4. Organizational Productivity	.46**	.53**	.58**	1

*Note: ** $p < 0.01$ (2-tailed)*

The findings indicate that there are positive and statistically significant correlations between all the variables. The awareness of AI tools and the availability of AI tools and resources are closely linked to the productivity of an organization. Additionally, the effectiveness of AI integration is positively related to organizational productivity, which is a preliminary confirmation of the hypotheses suggested.

Regression Analysis

To determine the direct impacts of artificial intelligence practices on organizational productivity, a multiple regression analysis was performed. Table 4 provides the results.

Table 4

Regression Results: AI Practices → Organizational Productivity

Predictor	β	t-value	Sig.
AI Tools Awareness	0.412	6.87	0.000
AI Tools & Resources Availability	0.447	7.32	0.000
R^2	**0.79**		
F-value	**330.45**		0.000

The regression model captures 79 percent of the variations in the productivity of organizations (R 2 = 0.79). The positive and statistically significant effect of both AI tools awareness and AI tools and resources availability on organizational productivity is positive. These results validate H1 and H2 and prove that artificial intelligence practices have a great impact on the productivity of the FMCG industry in Pakistan.

Mediation Analysis (Baron & Kenny Method)

To test the mediating role of artificial intelligence integration effectiveness, mediation analysis was conducted following the Baron and Kenny approach. First, the relationship between AI practices and organizational productivity was established as significant (see Table 4). Second, AI practices were regressed on AI integration effectiveness, as shown in Table 5.

Table 5

Regression Results: AI Practices → AI Integration Effectiveness

Predictor	β	t-value	Sig.
AI Tools Awareness	0.521	8.91	0.000
AI Tools & Resources Availability	0.468	7.84	0.000
R^2	**0.83**		

Both dimensions of AI practices are significant predictors of AI integration effectiveness. The third step involved the regression of AI practices and the effectiveness of AI integration on organizational productivity. Table 6 contains the results.

Table 6

Mediation Regression Results

Predictor	β	t-value	Sig.
AI Tools Awareness	0.201	3.12	0.002
AI Tools & Resources Availability	0.227	3.54	0.001
AI Integration Effectiveness	0.463	7.96	0.000
R^2	**0.86**		

With the integration of AI effectiveness added to the model, the regression coefficients of AI tools awareness and AI tools and resources availability become less significant but still have a significant value. Simultaneously, the effectiveness of AI integration has a strong and significant positive impact on productivity in an organization. This shows partial mediation, which proves the effectiveness of the AI integration in mediating between artificial intelligence practices and organizational productivity. Accordingly, H3 is accepted.

Summary of Hypotheses Testing

Table 7

Hypotheses Results

Hypothesis	Statement	Result
H1	AI tools awareness positively affects organizational productivity.	Accepted
H2	AI tools & resources availability positively affects organizational productivity.	Accepted
H3	AI integration effectiveness mediates the relationship between AI practices and productivity.	Accepted

On the whole, the empirical results indicate that the practices of artificial intelligence can contribute to the organizational productivity in the FMCG sector in Pakistan to a considerable extent. Moreover, the findings demonstrate the critical mediating position of artificial intelligence integration effectiveness, and the gains in productivity are maximized when AI technologies are properly implemented in the organizational processes.

DISCUSSION

This research was aimed at investigating the effects of artificial intelligence practices on organizational productivity within the FMCG sector in Pakistan, and specifically, the moderating effect of the integration effectiveness of artificial intelligence. The results are very empirically valid for the proposed relationships and are mostly consistent with the existing studies on artificial intelligence and organizational performance.

The findings show that the awareness of artificial intelligence tools has a strong positive influence on organizational productivity. This observation implies that organizations can use AI tools to promote efficiency and performance when the employees are informed about AI tools and the ways they can be applied. This finding is consistent with previous research that highlights employee awareness and acquaintance with intelligent systems as the key to achieving productivity benefits amid the adoption of AI (Chen and Day, 2020; Chatterjee et al., 2022). Employee awareness seems to be a major factor in converting AI capabilities into concrete productivity gains within the FMCG setting, where the speed and efficiency of operations are paramount.

Likewise, the research concludes that access to AI tools and resources has a

considerable impact on the productivity of organizations. This finding upholds the thesis that AI infrastructure, technological resources, and human resources are critical in enhancing organizational performance. The existing literature has repeatedly demonstrated that the organizations that possess sufficient resources associated with AI are in a better position to streamline business operations, minimize operational inefficiencies, and enhance performance (Bharadiya, 2023; Kardinal et al., 2023). According to the findings, access to relevant AI tools and resources is a key determinant of productivity improvement in the FMCG industry in Pakistan.

More to the point, the mediation analysis shows that the effectiveness of the integration of artificial intelligence partially mediates the correlation between AI practices and organizational productivity. It means that AI tools awareness and resource availability can directly impact productivity, but their effect is enhanced when AI technologies are properly introduced into organizational workflows and processes. This observation adds to the accumulating literature that the adoption of AI is not enough to produce long-term performance gains unless it is accompanied by efficient integration strategies (Castaka et al., 2020; Ford et al., 2022). The partial mediation in this study indicates that AI practices both affect productivity directly and indirectly via better integration, and the strategic significance of implementing AI systems into the main organizational processes.

In general, the results can be seen as an expansion of current studies because they offer empirical data on the situation in a developing country, where the use of AI is at a comparatively low level. Due to the FMCG industry of Pakistan, the current study can add to the literature by establishing that AI-based productivity gains are not exclusive to advanced economies but can also be realized in emerging markets, provided that organizations can successfully integrate AI practices with integration capacity.

CONCLUSION

The proposed study will add to the existing body of literature on the topic of artificial intelligence and organizational performance, as it will be conducted in a way that empirically investigates the connection between artificial intelligence practices and organizational productivity in the FMCG industry of Pakistan. The results indicate that the application of artificial intelligence, especially the awareness of AI tools and access to AI tools and resources, positively affects the productivity of organizations to a large degree. Moreover, the research establishes that the effectiveness of integrating artificial intelligence is a key mediating factor in enhancing this connection.

The findings indicate that organizations can not only gain a significant level of productivity by embracing AI technologies but also by making sure that such technologies are properly implemented in their workflow and management. The partial mediation effect shows that although AI practices alone lead to productivity, they are significantly more effective when they are accompanied by appropriate

integration strategies. This shows the significance of considering artificial intelligence as a strategic organizational capability as opposed to a technological investment.

This study fulfills a significant gap in the literature related to the FMCG sector of Pakistan by offering empirical evidence on the same to both scholars and practitioners in the developing economies. The results highlight the possibility of artificial intelligence to act as a productivity driver in instances where organizations invest in awareness, resources, and integration capabilities concurrently.

Limitations and Future Research Directions

There are some limitations to this study that future research should consider. First, the data comes only from the FMCG sector in Pakistan due to cultural and technological differences between countries. This means the results may not apply to other countries. In the future, researchers should gather data from different cultures to make the findings more widely applicable.

The findings have important real-world applications for managers in the FMCG sector who are considering investing in AI-driven business solutions. This study offers managers guidance on how to make the most of AI. To fully benefit from AI, organizations must invest in AI practices throughout all parts of their business and support functions. The results can help managers understand the importance of developing AI practices. They should focus on the resources needed to support these practices, such as strong IT systems, a digital-friendly company culture, and employees who are skilled in technology. Recognizing the value of these and other types of resources can greatly improve the effectiveness of AI practices. Since digital transformation is still in early stages, especially in developing countries, AI can be difficult to adopt and integrate without enough employees who have the necessary AI skills. Therefore, organizations need to train their employees in AI-related skills.

Recommendations

On the basis of the empirical results of this paper, it is possible to formulate a number of evidence-based recommendations to decision makers and regulators who work in the fast-moving consumer goods (FMCG) sector of Pakistan. To start with, companies should strive to improve the employee aptitude and understanding of artificial intelligence (AI) tools by providing purposeful training programmes, workshops and everlasting learning programmes. Increasing the level of AI-related knowledge among the staff is likely to reduce the resistance to technological changes and make the use of AI systems more efficient.

Second, FMCG businesses should invest enough in AI applications and support infrastructure, including well-developed technological infrastructure and human capital. Without sufficient resources, AI implementation will be limited to mere surface-level and will not bring the expected productivity benefits. In turn, the strategic investment choices must focus on the acquisition of AI technologies as well as their regular maintenance and upgrading.

Third, organisations ought to lay emphasis on the smooth implementation of AI technologies into the business processes that already exist. This requires that AI efforts are aligned to overall organisational goals, workflow redesigned where necessary, and that human and machine intelligence are coordinated. A strong dedication to leadership and cross-functional cooperation can significantly improve the efficiency of AI integration.

Lastly, policymakers and regulators of the industry can contribute to the adoption of AI in the FMCG industry by supporting digital transformation projects, offering incentives to adopt technology, and encouraging skills-training programmes that center on artificial intelligence. These policy interventions should be able to hasten AI-based productivity gains and enhance the competitiveness of the FMCG sector in Pakistan.

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