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The Integration of AI in Small Enterprises and Its Impact on Productivity and Innovation

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Abstract

This research paper evaluates the use or integration of AI into small enterprises and the resulting impact on institutional productivity and innovation. The study applies an integrated research methodology to combine both qualitative and quantitative research techniques. The combined methods uses surveys to target 100 small enterprises, and interviews to absorb views held by small business owners. Results indicate that AI amplifies productivity through enhancing efficiency, saving on operational costs, improved customer service management, creating new business models, and new products/services. The overall interpretation leans towards AI carrying the capacity to hugely strengthen productivity and install innovation cultures within small enterprises.

Introduction

The current technology evolution phase has artificial intelligence (AI) at the center illustrating the huge impact potential that AI has in the business environment. AI adoption has attracted huge interest in large businesses but small enterprises are recognizing the value of incorporating AI into their activities. The consideration of AI by small enterprises rises on the background of affordable accessibility of AI tools. Accessibility facilitates optimization of business processes translating to enhanced productivity. Integration of AI into core operations signals the development and growth of innovation cultures. A small enterprise absorbing AI components and services will rationalize the absorption into permanent organizational behavior. AI use can open the doors to improved customer service, efficient supply chain mechanisms, task automation, and use of new operational models. In customer service, for example, AI can crucially assure personalized customer services in ways that can strengthen brand or product loyalty. All the productivity and innovation drivers had, for long, remained the exclusive preserve of large commercial facilities.

The delivery of productivity and innovation through AI in small enterprises does not ignore the presence of possible challenges. Small enterprises run on highly defined changes and any disruptive requirement including AI integration can frustrate operations. Constricted human resource capacities can imply skills short to initiate and implement the AI integration agenda. As part of the technology revolution, AI integration can expose small enterprises to data breaches' and privacy issues. This research evaluates the integration of AI in small enterprises with an aim of evaluating its impact on productivity and innovation.

The Review of Current Literature

Bahoo et al (2023), in a hybrid literature review, observe that AI has developed to the point of having components that can greatly enhance corporate productivity and efficiency. Fundamentally, for example,

Bahoo et al (2023) indicate the presence of cloud computing as an AI service that entities have to absorb. Big data and cloud computing remained the preserve of big businesses but small facilities now have to consider their data security and equally access data analytics' services. Bahoo et al (2023) also focus on the possible AI integration into supply chain activities with Culot et al (2024) indicating that companies can manage to share data among themselves. It is fairly possible for a small enterprise to integrate its data system with a supplier in a strategy aimed to enhance efficiency and saving time. Such a development can directly imply increased productivity. The overall interpretation of Bahoo et al. (2023) is the huge possibility of activating an innovation culture within a small enterprise through the AI integration.

Radicic & Petković (2023), focusing on the German SME environment, agree that resource constraints can hinder SMEs from adopting AI innovations thus decelerating adoption of AI cultures. The admission by the article, however, recognizes that SMEs can progressively integrate AI into their processes in respect to their respective budgets and capacities. Radicic & Petković (2023) also note that digital technologies' adoption can help firms recruit new competencies that can guide in the development of better products and introduction of new innovations. For example, the attraction of AI-compliant product officers in an information technology firm may encourage a consideration of AI-incorporated products. Similarly, recruitment of technology officers in product lines may allow the introduction of enhanced production mechanisms. The gist of the matter is diving into an innovation culture through AI integration and sustaining that culture. The Presence of AI integration option can accelerate an SME's entry into research and development (R&D) laying the ground for the determination of productivity frontiers and relevant innovation pathways. The decision to absorb AI potentially links a small enterprise with other AI applying entities leading to expanded business networks. The merits raised by Radicic & Petković (2023) directly translate to amplified productivity and solid innovation.

Qu et al (2021) posit the proven delivery of productivity in firms through technology absorption. AI is identified as making business research easier. The takeaway then becomes the possibility of small firms and businesses managing to make quality evidence-based decisions. A firm's management is fiercely interested in productivity, and the SME's management will likely use the evidence gained to enhance their efficiency. Qu et al (2021) evangelize the need for enterprises to internalize their operational size as a strategy of determining their most appropriate AI needs, the level of productivity available within accessible options, and the technology contribution to the overall innovation culture. Any absorption of the technologies without an evidence-based framework may create counterproductive results. Abrokwah-Larbi & Awuku-Larbi (2023) report AI positively impacting on financial performance in SMEs held within emerging economies. The data from 255 SMEs in Ghana also illustrates that artificial intelligence integration strengthens performance of business processes and learning and growth in SMEs (Abrokwah-Larbi & Awuku-Larbi, 2023). The study also declared the important value of artificial intelligence in aiding collaborative decision-making in the SMEs. The import from the literature is that AI integration grows productivity in firms and raises overall performance.

Yang (2022) investigates how artificial intelligence influences productivity in firms with focus on Taiwan. On productivity, Yang (2022) points to the possibility of firms in the medical field introducing remote-controlled medical services and managing to remotely dispense medical attention. Against that background, it becomes clear that AI has assisted companies, including small ones, in increasing their productivity. The import from that finding is that AI has the capacity to expand products or services range in firms. Yang (2022) also notes that a company making entry into the use of AI is likely to stick

to that route unless the technologies negatively interfere with the productivity. Even with the possibility of resource limitations, the value gained from AI integration can compel a firm to find the resources. Adigwe et al (2024) assert that AI integration can raise a firm's level of competitiveness. The competitiveness arises due to higher time and resource optimization. The delivery of improved products and services can raise the value of a business especially within industrial settings. A small enterprise applying AI to bring better services and products will attract attention to its end resulting in increased competitiveness. Adigwe et al (2024) also determines that AI integration can allow better socioeconomic activities and corporate social responsibility (CSR) initiatives leading to better business to community interactions.

Mohlala et al (2024) get directly to the dimension of AI impacting human resource productivity in SMEs. Mohlala et al (2024) directly indicates that AI results in a 29% improvement in employee productivity, 20% in decision-making, and 26% in operational efficiency. AI, as part of an innovation culture, may also SMEs a chance of sustaining research on future advancements around human resource and employee dynamics. Salah & Ayyash (2024) present that AI integration in SMEs signals an entity's readiness to initiate and sustain an innovation culture. The decision can open the space for substantive investment in innovations, and convince a firm to intentionally set aside necessary resources for that objective. Salah & Ayyash (2024) also report that the greater flexibility displayed by firms employing innovation encourages other entities to take that route. Initial innovations may also lay the foundation for aggressive adoption of innovative practices in firms. Chaudhuri *et al* (2022) introduce the reality of AI complementing human intelligence, and increasing efficiency specifically through machine learning. If a small enterprise can manage to access the right skills package in their employees, the combination of machine learning with human intelligence can greatly raise productivity levels. Chaudhuri et al (2022) send a reminder that SMEs must be ready with all requirements needed to run the AI integration agenda for them to extract the productivity and innovation benefits.

Methods

The research paper applied an integrated research approach applying both qualitative and quantitative research methods. The decision to prefer this route arose from the need to provide comprehensive findings around integration of AI in small enterprises and the resulting effects on productivity and innovation.

The quantitative dimension of this research paper involved a survey targeting 100 small businesses spread across varied industries. The sampling approach considered facilities that had integrated or absorbed artificial intelligence in at least one of their core business functions. The functions under focus are customer service management, supply chain logistics, communication, cloud computing, data analytics, data storage. This survey structured its queries or questions to interrogate the specific kind of AI components applied, the variations observed in the functions under focus, and the evident impact of AI adoption on revenue and/or profit. Statistical analyses through correlation, and regression aided in interpreting the survey and the results.

In the qualitative technique, the research focused on online interviews with 12 small enterprises' owners determined to access their observations on the integration of AI in their businesses, and the consequent impact on productivity and innovation. The interviews detained their mandate on the influence of AI in directing product and/or service development in firms, adjustments applied to operational models after AI integration or absorption, and the possible barriers and possibilities/opportunities possible with

sustained AI innovation in small businesses. Qualitative information, in this case, underwent analysis through thematic coding to interpret resulting patterns or thought patterns. The mixed methods' approach is expected to clearly highlight the actual realities facing small businesses on the matter of integration of AI into their operational processes.

Results

The results or findings from the mixed methods' approach focused on the effects of AI on productivity, impact or effect on innovation, and the barriers and/or challenges existent in the AI integration trajectory within small enterprises. 76% of the small businesses surveyed reported notable positive change in operational efficiency. The 76% registered the notable improvement within a calendar year after implementing AI integration. In the survey, participating enterprises marked a 27% reduction on time wasted on tasks. Using AI-driven data analytics resulted in a 10% decrease in registered stock shortage and recorded a 22% jump in supply chain productivity/efficiency. This data on productivity translates to better operations. Beyond productivity, 70% of businesses reported registering a 20% decline in operational costs specifically due to automated processes. These cost reductions were observed across communication, customer' service management, and supply chain functions. The entities that absorbed AI in their processes accessed a 10% rise in conversion rates leading to a better return on investment (ROI) on marketing. The productivity in marketing departments rose against decreasing expenses in the segments. 80% of the participants indicated significant changes in the outcomes of their decisions highlighting entry into quality decision-making frameworks. The improved decision-making happened from the background of evidence-based individual and institutional thinking. Accurate industrial and market estimates will certainly lead to better decisions.

Results on innovation were accessed from the qualitatively generated data. The first finding indicates that SMEs using AI components within their processes manage to provide new products or services compared to their non AI using peers. A related reporting is the possibility of offering personalized customer service management through the use of AI tools. One indicated case is the easy interpretation of consumer needs through AI-supported research. Still on innovation, manufacturers and producers integrating AI into their production processes have high chances of delivering highly customized products. These entities can provide these products on a scalable basis. Interviewed business owners also indicated noting the transformation in their business frameworks/models. For example, one proprietor confirmed transitioning from a traditional model to a highly customer-focused business framework. Within innovation, findings indicate that business owners considered taking up technological exploration as institutional behavior highlighting the installation of innovation cultures through AI integration.

The clear merits of AI integration do not completely erase the existence of barriers to the integration of AI within small enterprises. Implementation costs can challenge operational budgets and compel entities to ignore AI integration, and all of its evidence-based benefits. 41% of the participants noted that software purchase, possible development, and implementation discouraged absorption. Another visible challenge is low access to requisite skills. In interviews, business owners indicated that getting the right skills' set involved setting aside substantial resources to consider new skills or appropriate for skills' training. The inclusion of AI components, allied amenities, and skills added to operational costs. In businesses handling clearly sensitive consumer data, business proprietors pointed issues on data privacy and possible breaches. The concern forms a legitimate barrier base for business owners passing the challenge to researchers for solutions to the issues.

Discussion

The findings confirm, without a doubt, that AI integration has a positive impact on small businesses around productivity and innovation. An increase in operational efficiency is a positive vote on increased productivity. Larger enterprises have extensively extracted their benefits from AI integration. The results of this study, however, confirm that SMEs can leverage artificial intelligence components and optimize their processes while amplifying efficiency. On productivity, it is clear that process automation is a game changer in allowing SMEs a chance of achieving efficiency against a limited human resource capacity. The presence of AI supported communication bots, often identified as chat bots, allows small firms to operate with minimal agent interventions. From an institutional level, this development equals raising efficiency at manageable costs. It is necessary that small companies internalize the need to accurately appropriate their scarce resources so as to optimize returns.

The results have demonstrated clarity in highlighting the importance of AI integration in fostering innovation cultures within small enterprises. One of the birthed innovative pathways was expanded space to come up with new products and services. If an entity manages to create new offerings through AI, such a facility will intentionally invest to sustain their technology approach. The findings also brought out movement by small businesses towards data-centric decision-making mechanisms. The firm absorption of evidence-based decision making strategies will raise competitiveness levels and decrease errors. It is also notable to indicate that the barriers in the form of implementation costs and skills' limitations do pose a risk to the access of the mentioned AI benefits. The barriers highlight the need for small companies to conduct substantive assessments of their capacity situation to identify a practical AI integration strategy. AI as part of the rapid technological revolution will have to be part of organizational processes justifying the need to work around absorption.

Conclusion

AI absorption in processes executed by small enterprises forms an exciting opportunity to access benefits associated with this level of technology. This research paper firmly confirms the valuable role of AI in catalyzing evident improvements in productivity. The study has also demonstrated AI's potential to motivate innovation cultures in small firms. Small entities have a chance of redefining their business models and opening the space for improved services. The assignment left with the small enterprises is to understand the identified barriers to absorption, work around them, and position for benefits associated with AI integration.

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