DETERMINANTS OF AI ADOPTION IN E-COMMERCE AMONG SMALL AND MEDIUM-SIZED ENTERPRISES (SMES)

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Introduction

In order to boost sales and services and improve consumer happiness, many businesses aim to implement e-commerce. If effective e-commerce strategies and technologies are used, e-commerce can greatly increase SMEs' revenues and profitability (Abbas et al., 2023; Ojha et al., 2023). However, the degree of a company's dedication to and reliance on smart technologies and tools that help them provide the greatest technical services to their clients may have an impact on how well they use such electronic platforms (Mishra et al., 2023). In order to boost sales and services and improve consumer happiness, many businesses aim to implement e-commerce. In order to speed up business and give information that helps make appropriate and effective decisions in real time, artificial intelligence (AI) tools assist in analysing and exploiting the huge data that is available to many firms and organisations (Kushwaha et al., 2021; Sestino & De Mauro, 2022). Artificial intelligence (AI) tools evaluate consumer data to produce useful insights and support strategic decision-making across a variety of data sources (Verma et al., 2021). Numerous scientific research have examined how AI can be used in e-commerce to improve customer service, speed up sales, and gather data (Xu & Ruan, 2023; Li et al., 2023).

Research on the importance of using and improving AI technologies in maintaining e-commerce business performance and bolstering the contribution of entrepreneurship to SMEs' success is, nevertheless, lacking. Therefore, in order to encourage entrepreneurship and increase and activate the role of these businesses in the advancement and development of the nation's economies, this study aims to explore and examine the factors influencing the adoption of AI in e-commerce in SMEs.

According to North et al. (2020), because of their high employment and commercial value, SMEs have a significant and impactful role in the high economy. Nevertheless, these businesses have numerous obstacles when it comes to implementing new technologies and staying up to date with advancements in technology (Barata et al., 2023; Cheng et al., 2024). Understanding the elements that influence the adoption of AI in e-commerce can therefore lead to a variety of solutions that enable the adoption of AI tools and raise the market value of their goods and services. Furthermore, SMEs struggle to make decisions that enhance their business performance because they don't fully use data (Sharma et al., 2022). As a result, this study advances our understanding of the challenges and offers solutions for SMEs looking to implement AI in e-commerce.

This study intends to cover a number of crucial factors that propel and impact the adoption of artificial intelligence (AI) in e-commerce by small and medium-sized businesses (SMEs) in light of the aforementioned debate. To direct the study and offer an organised method for comprehending the different elements involved, the following important research questions have been developed.

1. What aspects affect SMEs' use of AI in e-commerce?
2. How much do entrepreneurial spirit and dynamic capacities play a role in SMEs' use of AI in e-commerce?

3. How much does the use of AI in SMEs' e-commerce depend on a customer-centric system?
4. To what degree does an entrepreneurial mindset influence SMEs' adoption of AI in e-commerce?
5. How much of an influence does the use of AI in e-commerce have on the operations of SMEs?

Literature review

In order to process data without the need for human intervention and provide accurate and highly efficient information, artificial intelligence is essential (Cubric & Li, 2024). Customers will be more satisfied with the website as a result of meeting their requirements and preferences in addition to saving time. In order to ensure seamless and easy operations, this involves providing a variety of e-commerce features, such as product promotion, payments, and delivery. As a result, businesses may be able to learn important things about the market, consumer behaviour, and company performance over time (Qi et al., 2023). Artificial intelligence (AI) tools can offer answers and recommendations based on customers' requirements and preferences by examining their product clicks (Sharma et al., 2021).

Additionally, it can help with answering consumer questions via chat platforms, improving the business's capacity to react quickly (Gupta et al., 2024). Pallathadka et al. (2023) claim that artificial intelligence (AI) in e-commerce aids in boosting sales, forecasting sales, achieving a greater level of safety, thwarting fraud, managing business, and managing essential services on the website. AI is capable of carrying out human tasks that call for intelligence in its operations, such translating languages or recognising people visually. In order to maximise value and competitive advantage, SMEs must use AI technologies, which include lowering human mistake rates, analysing client data, and offering incredibly effective services.

Theoretical background, conceptual model, and development of hypothesis

In order to improve the function of AI in facilitating e-commerce and understand the entrepreneurial role in offering more effective goods and services, this study will rely on the idea of dynamic capacities (Teece, 2010). One of the ideas frequently employed in research examining how businesses get a competitive edge by concentrating on the impact of changes in the external environment is dynamic capabilities (Yạnez-Vald´es & Guerrero, 2024). The ability of the business to seize opportunities and reconfigure and utilise both internal and external resources in quickly evolving work settings is sometimes referred to as dynamic capabilities (Gao et al., 2024; Karimi & Walter, 2015; Wang et al., 2023).

Aloulou's (2023) study used a sequential mediation paradigm incorporating innovation capability and business resilience capability to examine the relationship between entrepreneurial orientation, attitudinal variables, and firm performance. 125 SMEs in Chennai participated in a survey that was used to collect data. The study's findings demonstrate that the behavioural aspect of entrepreneurial attitude improves business performance. The study also shows that aspects of entrepreneurial orientation have a big impact on innovative capability. Furthermore, the ability to innovate has a favourable impact on business performance. Daniel and Wilson (2003) conducted another study that looked into the dynamic capabilities that support and grow electronic company while finding several techniques that create useful capabilities to boost business success.

According to the study's findings, businesses must identify and implement cutting-edge services that enhance their operations and how they engage and communicate with stakeholders.

Additionally, they emphasised how crucial it is to operate as a single, cohesive team in order to attain a high level of synergy and deliver reliable service.

Methodology

Questionnaires are used in the study's quantitative methodology to gather information from SMEs' officials. In order to improve the study's findings, this goal is to investigate elements associated with AI adoption in the context of e-commerce while taking the pertinent literature into account. The purpose of the questionnaire is to determine variables pertaining to the degree of AI adoption at the moment, as well as perceived advantages and difficulties. Finding the elements affecting AI adoption in the context of e-commerce is also important. Chennai-based e-commerce workers. Regarding their principal occupations, store owners and supervisors were the focus of the sample. To encourage participation in the study, the owners of electronic stores were contacted via email, WhatsApp, and phone calls in addition to in-person visits to SMEs.

A digital survey was created and disseminated to SMEs' authorities and decision-makers involved in e-commerce. The questionnaire covered a wide range of topics necessary for the study, such as the adoption of AI-enhanced e-commerce, dynamic capabilities, customer-oriented management systems, and entrepreneurial attitude. This helped gather comprehensive and precise data that supported the study's goal by testing hypotheses and producing findings. The purpose of the questionnaire was to gather more information about the perceived advantages, difficulties, and current degree of AI adoption. Furthermore, the elements impacting AI adoption in the context of e-commerce.

Since the results of the questionnaire help to produce precise and effective quantitative results quickly with a high sample size, the quantitative technique is deemed appropriate and beneficial for this study. Furthermore, questionnaires offer a uniform and comparable approach to gathering information from research participants, enabling consistent findings that are simple to compare and evaluate.

Data analysis

To evaluate the information gathered from the surveys and test the theories, structural equation modelling was used. According to Benitez et al. (2020), SEM is regarded as one of the widely used statistical analysis methods that produces more accurate results than more straightforward methods like linear regression. SEM is a method that tests several measurable variables, combining elements of multiple regression and factor analysis.

Major Findings:

The data indicates a variety of job fields. Retail trade (33.5%) and agriculture (4.1%) are the most important, followed by "Other" categories (62.1%), which may encompass a variety of unidentified businesses. Marketing has the highest representation of any functional area (38.3%), followed by "Other" (25.7%) and Operations and Sales (15.3%). This suggests that these organisations place a high priority on marketing initiatives. All latent constructs' CR values, which ranged from 0.812 (EO) to 0.977 (DYC), were determined to be higher than the recommended value of 0.50. As all of the indices fall within their recommended range, such as CMIN/DF=2.747; GFI=0.919; AGFI =0.887, RMSEA=0.038; NFI =0.945; and CFI =0.951, the fit indices sufficiently support the whole measurement model's goodness of fit (Anderson & Gerbing, 1988; Bagozzi & Yi, 1988; Byrne, 2013). (Bagozzi & Yi, 1988; Anderson & Gerbing, 1988). As recommended by Fornell and Larcker (1981); Hair et al. (2010), an examination of AVE values indicates that CCMS,

BDA, BP, and DYC were able to have a value not less than 0.50. Nevertheless, EO's AVE value was 0.47, below the cutoff point of 0.50.

As a result, EO1 and EO6 were eliminated from the updated measurement model after a thorough examination of the standardised regression weight of the EO scale items revealed that they had factor loading values below 0.50. Following adjustment, EO's AVE value was 0.52, falling within the suggested range (Hair et al., 2010). Fornell & Larcker, 1981; Hair et al., 2010), as seen in Table 5. The squared root of AVE computed for each latent construct was found to be higher than the intercorrelation values with other relevant components, hence achieving the discriminant validity of the entire model in the current investigation.

Discussion

The purpose of this study was to look into the variables affecting SMEs' adoption of AI in e-commerce. The conceptual model, developed research hypotheses, and empirical data constitute the framework for the study's methodology and conclusions. The study's main conclusion is that SMEs' adoption of AI in e-commerce is significantly predicted by dynamic capabilities and EO. A significant R2 value of 0.56, which shows that these two factors account for a significant portion of the variance in AI adoption, supports this. Additionally, the study shows a substantial correlation between improved business performance among SMEs and the use of AI in e-commerce.
An R2 value of 0.65 provides numerical support for this link, indicating that the degree to which these businesses successfully implement AI technologies accounts for a sizable amount of the variation in business performance. The study emphasises how important EO and dynamic skills are in propelling AI adoption in SMEs' e-commerce industries, which may significantly boost company performance. This emphasises how crucial it is for SMEs in the e-commerce industry to cultivate these skills and mindsets in order to successfully use AI technology for business expansion and prosperity.

"The firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" is the definition of dynamic capabilities (Teece et al., 2007). This idea is essential to comprehending how businesses adjust to technological advancements such as artificial intelligence. In order to increase organisational flexibility and innovate to boost corporate performance and competitiveness, Teece, Peteraf, and Leih (2010) stress the significance of dynamic skills.

As Drydakis (2022) points out, the concept of dynamic capabilities logically corresponds with the use of AI in corporate operations. Businesses can analyse vast amounts of data more effectively thanks to AI, which improves their capacity to spot new possibilities and quickly reallocate resources. The two main components of dynamic capabilities—risk reduction and decision-making enhancement—are especially aided by this capacity. The adoption of e-commerce is significantly boosted by AI and an inventive culture. Furthermore, using AI, Fonseka et al. (2022) investigated how management perceived the effect of e-commerce adoption on SMEs' company performance. The study's findings suggest using AI to automate tasks that might be difficult for staff to handle efficiently and implementing e-commerce as a marketing tactic. Additionally, by incorporating and applying AI into their business processes, digital platforms help SMEs perform better and increase commercial opportunities (Wei & Pardo, 2022). AI capabilities and technologies have a favourable impact on companies' business performance and this leads to making educated decisions based on AI (Li et al., 2024).

The tendency to recognise, assess, and seize opportunities is a hallmark of entrepreneurial orientation. This notion, key to the works of (Kusa et al., 2024), and Fernandes et al. (2022), is primarily about keeping a proactive and alert position in the search of possibilities, combined with the willingness to embrace the risks involved. Upadhyay et al. (2023) and Upadhyay et al. (2022) further expand on this by linking EO to a company's readiness to develop essential competencies that enable the identification and capitalization of hidden opportunities. As highlighted by Avlonitis and Salavou (2007) and Fernandes et al. (2022), seeking opportunities is a critical competency of EO. In order to recognise and take advantage of emerging technologies like artificial intelligence (AI) in e-commerce, businesses with a strong EO are skilled at identifying both obvious and hidden opportunities in their market. In order to effectively integrate AI into business processes and customer engagement strategies, it is imperative that businesses adapt to changing consumer demands and competitor strategies.

Practical implications

SMEs ought to promote an entrepreneurial environment that appreciates creativity, initiative, and a readiness to embrace risks. This approach will not only promote the integration of AI but also foster a mindset that is receptive to investigating new technologies and business strategies. Workshops, leadership development, and reward systems can be created to encourage and strengthen these entrepreneurial principles. The significant link between AI implementation and business outcomes indicates that SMEs ought to purposefully integrate AI into their business frameworks. This requires pinpointing aspects where AI can provide the greatest benefits, like customer support, data evaluation, and operational effectiveness, and investing in appropriate AI solutions.

Considering the influence of AI on business outcomes, SMEs ought to allocate resources towards training their employees in pertinent AI technologies and data analytics. This not only equips the workforce to effectively engage with new technologies but also aids in maximizing AI's full capabilities. Adopting new technologies carries risks, so SMEs must create strong risk assessment and management strategies. This involves assessing the financial, operational, and security risks linked to AI technologies and applying suitable mitigation measures.

Although the research did not identify a substantial impact from customer-oriented systems, professionals should still acknowledge the possibility of AI to improve customer interactions. This includes utilizing AI for tailored marketing, enhanced customer support, and deeper insight into customer preferences and actions. SMEs ought to consider AI adoption not merely as a technological enhancement but as a strategic initiative for securing a competitive advantage. This encompasses leveraging AI to enhance product/service offerings, optimize operations, and develop new customer value propositions. Ongoing assessment and evaluation of AI applications are essential. This aids in evaluating the influence of AI on business outcomes and in implementing required modifications to strategies and operations

Limitations and future research directions

The research focuses on examining how dynamic capabilities (the capacity to adjust and reorganize business strategies and operations) and EO (a company's strategic stance marked by innovativeness, proactiveness, and risk-taking) affect the implementation of AI in SMEs. Notably, it also takes into account customer-centric systems, which usually entail using technology to gain a deeper insight into and meet customer requirements.

The research focuses solely on the implementation of AI in small and medium-sized enterprises. This emphasis offers important perspectives on how SMEs, which typically possess varying resources and limitations in contrast to larger firms, adopt and incorporate AI into their processes. Nonetheless, the results may not be completely applicable to larger firms or other industries that may possess unique dynamics and obstacles in AI implementation.

The outcomes may be affected by the particular economic, cultural, and technological environment of chennai, which could vary considerably from other areas. This geographical emphasis offers significant insights into AI implementation in this particular context, yet it may restrict the applicability of the results to different areas.

A noteworthy result of the research is that it did not uncover substantial evidence for the importance of customer-oriented systems in AI adoption. This may imply that, for SMEs in chennai, additional elements (such as dynamic capabilities and entrepreneurial mindset) play a more vital role in AI adoption, or it might show that customer-centric strategies are not being successfully merged with AI technologies in these SMEs.

The methodology of the study failed to consider possible mediation or moderation influences. Mediation factors may clarify the connection between primary variables (e.g., how entrepreneurial orientation results in AI adoption), while moderation factors could affect the intensity or nature of these connections (e.g., how specific industry traits might enhance or diminish the effect of dynamic capabilities on AI adoption). The lack of these factors could restrict the comprehension of the intricate relations among the examined variables.

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