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LEVERAGING ARTIFICIAL INTELLIGENCE FOR THE SUSTAINABILITY OF FAMILY-OWNED BUSINESSES IN THE CONTEXT OF EMERGING ECONOMIES

APROVEITANDO A INTELIGÊNCIA ARTIFICIAL PARA A SUSTENTABILIDADE DE EMPRESAS FAMILIARES NO CONTEXTO DE ECONOMIAS EMERGENTES

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Abstract
This study examines the potential of Artificial Intelligence (AI) as a transformative mechanism for enhancing the sustainability and operational continuity of Family-Owned Businesses (FOBs) in Southeast Nigeria. The study explores how AI adoption can help address operational inefficiencies, improve decision-making, and support intergenerational continuity. The study employs a qualitative methodology grounded in an extensive analysis of secondary materials, including books, policy reports, and peer-reviewed journal articles. The literature review focused on conceptual foundations of AI, areas of AI adoption in FOBs, challenges impeding AI

Resumo
Este estudo examina o potencial da Inteligência Artificial (IA) como um mecanismo transformador para aprimorar a sustentabilidade e a continuidade operacional de Empresas Familiares (EFs) no Sudeste da Nigéria. O estudo explora como a adoção da IA pode ajudar a solucionar ineficiências operacionais, melhorar a tomada de decisões e apoiar a continuidade intergeracional. O estudo emprega uma metodologia qualitativa fundamentada em uma extensa análise de materiais secundários, incluindo livros, relatórios de políticas públicas e artigos de periódicos revisados por pares. A revisão da

integration, and strategies for sustainable AI implementation. A thematic analysis framework was applied to synthesise insights across these areas, enabling the identification of patterns and implications for FOB sustainability. The literature indicates that AI adoption can enhance efficiency, decision-making, operational resilience, and competitiveness in FOBs. However, adoption is hindered by factors such as limited digital literacy among senior decision-makers, resistance to change rooted in family values, high implementation costs, inadequate infrastructure, and insufficient access to technical expertise. Strategies for overcoming these challenges include aligning AI integration with family-specific resources, effective succession planning, and culturally sensitive change management.mWhile extensive research exists on the sustainability challenges of FOBs, particularly in African contexts where survival rates are low, few studies have explored the role of AI in addressing these challenges. This study provides a novel conceptual contribution by highlighting AI as a strategic tool to strengthen operational performance, intergenerational continuity, and long-term competitiveness in family businesses. It also lays the groundwork for future empirical studies on AI adoption in emerging economies.

Keywords: Family-Owned Businesses (FOBs). Artificial Intelligence (AI). Business Sustainability. SMEs in Developing Countries.

literatura concentrou-se nos fundamentos conceituais da IA, nas áreas de adoção da IA em EFs, nos desafios que impedem a integração da IA e nas estratégias para a implementação sustentável da IA. Uma estrutura de análise temática foi aplicada para sintetizar insights nessas áreas, permitindo a identificação de padrões e implicações para a sustentabilidade das EFs. A literatura indica que a adoção da IA pode aprimorar a eficiência, a tomada de decisões, a resiliência operacional e a competitividade em EFs. No entanto, a adoção é dificultada por fatores como alfabetização digital limitada entre os principais tomadores de decisão, resistência à mudança enraizada em valores familiares, altos custos de implementação, infraestrutura inadequada e acesso insuficiente a conhecimento técnico especializado. As estratégias para superar esses desafios incluem alinhar a integração da IA com recursos específicos da família, planejamento sucessório eficaz e gestão de mudanças culturalmente sensível. Embora exista uma extensa pesquisa sobre os desafios de sustentabilidade das empresas familiares, particularmente em contextos africanos onde as taxas de sobrevivência são baixas, poucos estudos exploraram o papel da IA no enfrentamento desses desafios. Este estudo oferece uma contribuição conceitual inovadora ao destacar a IA como uma ferramenta estratégica para fortalecer o desempenho operacional, a continuidade intergeracional e a competitividade a longo prazo em empresas familiares. Ele também estabelece as bases para futuros estudos empíricos sobre a adoção da IA em economias emergentes.

Palavras-chave: *Empresas familiares. Inteligência Artificial (IA). Sustentabilidade Empresarial. PMEs em Países em Desenvolvimento.*

1 INTRODUCTION

Historically, family-owned businesses (FOBs) have served as the backbone of economic growth in both developed and emerging economies. Many of these firms began as small trading ventures but gradually expanded into large entities that now shape national economies (Colli, 2016; Atienza-Barba *et al.*, 2025). Unlike other forms of business ownership, FOBs are distinguished by intergenerational control, strong family values, and a long-term orientation, attributes that promote continuity, legacy

preservation, and resilience across generations (Häussler & Ulrich, 2024; Miller & Le Breton-Miller, 2005). The FOB sector is closely associated with small and medium-sized businesses (SMEs), which are essential to global socio-economic development since they create jobs, reduce poverty, and innovate. Their contributions to national growth are widely acknowledged across contexts (Arachie *et al.*, 2023; Arachie *et al.*, 2025; Halabí & Lussier, 2014; Ogechukwu, 2011; Akingunola, 2011; Ogbo & Nwachukwu, 2012). From an international perspective, SMEs and FOBs are central to economic development strategies in both advanced and emerging markets. For example, in Europe and North America, family firms have embraced structured succession planning, professional management, and technological adoption as strategies for long-term sustainability (Sawang & Kivits, 2023; Liu, 2020). In Asia, FOBs and SMEs have actively leveraged digitalisation and innovation to scale operations and enhance competitiveness, with AI emerging as a strategic driver of efficiency, market advantage and sustainability (Monyei *et al*, 2023; Zhang & Ma, 2022). Global evidence consistently demonstrates that firms adopting technological innovations outperform those that do not, with AI integration improving productivity, decision-making, and growth prospects (Chan *et al.*, 2019; Anuj *et al.*, 2021). A global survey further highlights that approximately 35% of firms across sectors already deploy AI in their operations, illustrating the growing trend toward digital transformation (IBM, 2022). In contrast, Africa and Nigeria in particular face daunting sustainability challenges for SMEs and FOBs. According to reports from the National Bureau of Statistics (NBS) and the Small and Medium Enterprise Development Agency of Nigeria (SMEDAN), the number of SME start-ups fell by 3.5% between 2017 and 2020. Nearly 80% of businesses failed within five years as a result of unfavourable business environments and structural difficulties (Dilger, 2018; Akinyemi & Adejumo, 2018; Nnabuife *et al*., 2018; Onwe *et al*., 2023). Given that the majority of Nigerian SMEs are family-owned, these failures translate into a high mortality rate among FOBs. Oyeyinka (2010) reports that nearly 96% of Nigerian firms are privately owned small indigenous enterprises, the vast majority of which operate as FOBs. However, these enterprises rarely survive beyond the founder's lifetime, with studies showing that while 30% transition into the second generation, only 12% remain viable into the third, and a mere 3% persist into the fourth and subsequent generations (Nnabuife *et al.*, 2018). Scholars have long underscored succession planning as a vital strategy for FOB survival and continuity (Nnabuife *et al.*, 2019; Nnabuife & Okoli, 2017; Jideofor *et al.*, 2023;

Ayoola *et al.,* 2023; Akindele *et al.,* 2022). Although limited attention has been given to the potential role of technological innovation, particularly AI, as a mechanism for sustaining FOBs in Nigeria and Africa more broadly. This neglect is compounded by the perception that family firms are among the slowest to adapt to disruptive technologies (McElheran *et al.,* 2021). Moreover, many Nigerian FOB owners lack awareness of the strategic significance of AI, often regarding it as a resource exclusive to large corporations (Ayodele *et al.,* 2018; Arachie *et al.,* 2023). This contrasts with global perspectives suggesting that AI can be meaningfully integrated into smaller family enterprises to enhance strategic decision-making and competitiveness (Sawang & Kivits, 2023). This divergence between international experiences and local realities highlights a pressing research gap: while AI has been shown globally to enhance resilience, productivity, and growth in family businesses, its adoption among Nigerian FOBs remains minimal. Consequently, examining the potential of AI as a sustainability mechanism for family-owned enterprises in Nigeria is both timely and essential. Ideally, family-owned businesses (FOBs), particularly small and medium-scale enterprises (SMEs), should serve as resilient drivers of economic growth, providing employment, fostering innovation, and sustaining intergenerational wealth. Globally, successful FOBs have demonstrated how structured succession planning, professionalised management, and the adoption of innovations such as Artificial Intelligence (AI) can enhance long-term survival, competitiveness, and expansion across generations (Sawang & Kivits, 2023; Liu, 2020; *Chan et al.,* 2019). In advanced economies and parts of Asia, for example, family firms have increasingly embraced technological transformation as a means of sustaining relevance in dynamic business environments (Zhang & Ma, 2022). In Nigeria, however, this ideal remains largely unmet. Despite their dominance in the private sector, most family-owned SMEs face structural challenges, poor succession planning, limited technological adoption, and an unfavourable business environment (Nnabuife *et al.,* 2018; Akinyemi & Adejumo, 2018; Onwe *et al.,* 2023). Empirical evidence shows that nearly 80% of SMEs collapse within five years of establishment, with FOBs being particularly vulnerable, as only 30% survive into the second generation, 12% into the third, and 3% into the fourth (Nnabuife *et al.,* 2018). A key gap lies in their slow adaptation to technological disruption, with many FOB owners perceiving AI as relevant only to large corporations (Ayodele *et al.,* 2018; Arachie *et al.,* 2023). This neglect contrasts sharply with international evidence, where AI integration has already

transformed business models and enhanced competitiveness (IBM, 2022). The consequence of this disconnect is that Nigerian FOBs, which should be central to sustainable economic growth, continue to face high mortality rates, loss of intergenerational wealth, and missed opportunities for global competitiveness. This situation undermines not only family legacies but also national development, as the collapse of these businesses erodes employment, reduces innovation capacity, and weakens the broader SME sector. Unless urgent steps are taken to explore and embrace mechanisms such as AI adoption alongside succession planning, Nigerian FOBs risk further decline in an increasingly digitalised global economy.

2 REVIEW OF RELATED LITERATURE

2.1 Resource-Based View (RBV)

Wernerfelt (1984) and Barney (1991) developed the Resource-Based View after Penrose (1959) initially proposed it. The VRIN criteria—valuable, rare, unique, and non-substitutable—are the foundation of a company's internal resources and competencies, according to RBV. Performance is determined by the distinct bundles of tangible and intangible resources that make up a firm. The firm is heterogeneous in its resource endowments; resources are not perfectly mobile between firms; managers can identify and develop resources into capabilities; superior performance flows from resources that meet VRIN conditions. AI should be treated as a potential strategic resource or capability. When family firms combine AI (a technological capability) with family-specific intangible resources (reputation, customer ties, tacit founder knowledge and "patient capital"), they can create unique routines and competitive advantages that are difficult for rivals to copy. From RBV, empirical measures might include the intensity of AI use, uniqueness of family resources (e.g. tacit knowledge), and performance/survival outcomes (Liu, 2020; Chan *et al.,* 2019). RBV, therefore, frames AI adoption as an investment that can strengthen FOB's strategy sustainability if integrated with other firm resources (Monyei *et al*, 2023; Barney, 1991; Miller & Le Breton-Miller, 2005).

2.2 Family-owned businesses

Family-owned businesses (FOBs) are companies where family members have a major influence on management and ownership, to pass control down through the generations, either explicitly or implicitly (Monyei *et al*, 2021; Miller & Le Breton-Miller, 2005). They are unique in that they blend economic objectives, such as profitability and growth, with non-economic goals, including family legacy, identity, and social reputation (Häussler & Ulrich, 2024). This dual orientation makes them distinct from other organisational forms where ownership and management are separated. A defining characteristic of FOBs is their long-term orientation. Families often seek to preserve and pass on the business to future generations, which encourages stability, resilience, and a deep commitment to continuity (Colli, 2016). However, this same intergenerational orientation also exposes such firms to challenges, particularly when succession is poorly managed. Research indicates that a mere 30% of family firms endure into the second generation, 12% into the third, and just 3% into the fourth. This highlights the importance of succession planning in ensuring the survival of these enterprises (Nnabuife *et al*., 2018). Globally, FOBs account for a substantial share of the private sector, playing pivotal roles in job creation, wealth distribution, and innovation (Atienza-Barba *et al.,* 2025). They exist across all scales, from micro and small firms to some of the world's largest corporations, but their uniqueness lies in the integration of family ownership and influence within governance and decision-making structures (Zhang & Ma, 2022). This influence often leads to strong family values being embedded into business strategies, shaping organisational culture and long-term direction. Despite their strengths, FOBs face unique vulnerabilities. Conflicts between family members, resistance to change, and lack of professionalisation can threaten business stability (McElheran *et al.,* 2021). The overlap of family and business systems often creates governance complexities, where personal relationships interfere with rational decision-making. These challenges, if unmanaged, heighten the risk of premature collapse and the loss of intergenerational wealth and legacy. Nevertheless, contemporary research demonstrates that FOBs that adopt professional governance practices, embrace innovation, and integrate sustainability into their operations tend to outperform those that rely solely on traditional structures (Sawang & Kivits, 2023; Liu, 2020). The combination of family commitment and innovative capacity provides a competitive advantage,

enabling them to balance legacy preservation with adaptability in dynamic environments. Family-owned businesses are vital contributors to economic and social development worldwide. Their defining features, family control, long-term orientation, and integration of values offer both strengths and vulnerabilities. The ability of FOBs to survive and thrive across generations depends largely on how effectively they manage succession, professionalise their governance, and adapt to innovation and sustainability demands.

2.3 Sustainability

Sustainability is the ability to meet current demands without compromising the ability of future generations to meet their own, as first popularised by the Brundtland Commission in 1987. Often referred to as the "triple bottom line," sustainability in the corporate context encompasses social and economic aspects in addition to environmental preservation. It suggests that in order for an organisation to be relevant and viable over the long run, it must concurrently pursue social justice, environmental preservation, and profitability. This holistic approach recognises that enduring success requires balancing financial performance with responsibility towards people and the planet (Aparicio & Iturralde, 2023). Sustainable practices enhance organisational competitiveness, customer trust, and long-term growth. Clemente-Almendros *et al.* (2025) found that organisational agility, managerial education, and international exposure significantly influenced the extent to which Spanish SMEs embraced sustainable practices, suggesting that sustainability adoption is closely linked with capability-building and adaptive strategies. Similarly, research by Parayil Iqbal *et al.* (2025) in the Gulf region identified that while regulatory frameworks, stakeholder demands, and entrepreneurial values stimulate sustainability adoption, barriers such as limited financial resources, inadequate institutional support, and lack of skilled human capital restrict implementation. This reflects a wider challenge for developing economies, where institutional and structural limitations slow down the integration of sustainability into business operations. In the Nigerian context, sustainability is especially critical for SMEs and family-owned firms that dominate the private sector. Adebimpe-Lincoln (2025) and Monyei *et al* (2023) observe that while many Nigerian SMEs recognise the importance of sustainability, their efforts are often constrained by limited resources and insufficient policy support, which makes it difficult for them to adopt advanced sustainability models such as circular

economy practices. This challenge partly explains the high mortality rate of SMEs in Nigeria, where many businesses fail within the first five years of operation. Without structured sustainability strategies, family-owned enterprises risk losing their competitive edge and struggling to achieve intergenerational continuity. Globally, evidence suggests that sustainability practices enhance firm performance. A meta-analysis of 83 studies revealed that social and environmental sustainability strongly improve SME competitiveness, offering empirical support from stakeholder and institutional theory perspectives (Springer, 2025). Similarly, European research demonstrates that when sustainability strategies are combined with innovation, firms experience improved sales performance and long-term resilience (Springer, 2025). The emphasis on innovation is particularly relevant for family-owned enterprises, as entrepreneurial orientation and the willingness to adopt new technologies often determine their ability to sustain operations across generations. In line with this, Jamil *et al.* (2025) argue that strategic entrepreneurship in family firms contributes to sustainability, though it is frequently underutilised in practice. The role of governance and inclusivity in sustainability is also increasingly acknowledged in the literature. Al Rawaf and Alfalih (2024) show that governance structures and women's empowerment significantly strengthen the sustainability performance of Saudi Arabian family firms, highlighting that effective leadership and inclusive decision-making can improve long-term outcomes. Similarly, a study published in the Journal of Business Ethics in 2025 reported that family firms often exhibit stronger environmental responsibility than non-family firms, particularly when family members are actively represented on boards, suggesting that family identity itself can act as a driver of sustainable behaviour. These perspectives suggest that sustainability for family-owned businesses is not only a matter of adopting environmental practices but also of embedding governance, innovation, and inclusivity into business operations. For Nigerian FOBs, sustainability can therefore be understood as a dual imperative: preserving legacy and ensuring intergenerational continuity, while also adapting to global pressures for responsible and innovative practices. By integrating sustainability into their strategies, these businesses can overcome structural challenges, enhance competitiveness, and secure long-term survival in a rapidly changing business environment.

2.4 Artificial intelligence

John McCarthy is credited with coining the term artificial intelligence (AI) during the 1956 Dartmouth Conference (Sawang & Kivits, 2023; Arachie *et al*., 2023). When artificial intelligence (AI) first emerged in the 1950s, it was thought to be a potent tool for increasing productivity, encouraging creativity, and maintaining industry competitive edge (Natale & Ballatore, 2020). Fundamentally, artificial intelligence (AI) is the process of using computer programs and systems to assist in decision-making by teaching computers to think and act on their own. Smith and Neupane (2018) define AI as "an area of computer science devoted to developing systems that can be taught or learned to make decisions and predictions within specific contexts" (p. 10). In a similar vein, the European Commission (2018) and Etele *et al*. (2024) define AI as systems that exhibit intelligent behaviour by assessing their surroundings and choosing the best course of action on their own to accomplish predetermined goals. According to Sawang and Kivits (2023), artificial intelligence (AI) can alternatively be defined as the computer emulation of human cognitive processes, including learning, reasoning, problem-solving, perception, and language understanding. As stated by Okwudiri *et al*. (2025), citing Adigwe *et al*. (2024). AI encompasses a wide array of procedures through which machines are trained to imitate and replicate human actions. The central goal of AI is to develop systems capable of emulating human-like behaviour in tasks requiring perception, cognition, and decision-making (Prem, 2019). Ufomba *et al*. (2024) assert that AI presents a promising opportunity to transform operations within Family-Owned Businesses, much like its impact on education. Advances in computing power, the emergence of enabling technologies like machine learning, computer vision, and natural language processing, as well as the availability of large datasets for algorithm training, are all factors contributing to its increasing importance. AI has grown in importance in the business world for a variety of uses, including natural language processing, automation, and predictive analytics (Kabir, 2020). According to Basri (2020), Chan *et al*. (2019), Jabłońska & Pólkowski (2017), Ulas (2019), Ulrich *et al*. (2021), and others, it helps organisations by tracking user behaviour, providing tailored recommendations, improving consumer purchasing experiences, optimising communication, and increasing efficiency while cutting costs. Its adoption, therefore, extends beyond operational efficiency to creating new forms of value and competitive differentiation. Scholarly discourse also highlights

AI's growing role in innovation. Kakatkar *et al.* (2020) demonstrate that AI enhances innovation decisions by enabling digital experimentation and knowledge creation. Similarly, Mariani and Nambisan (2021) argue that AI facilitates digital innovation, while Di Vaio *et al.* (2020) emphasise its role in advancing sustainable business models. In supply chain contexts, AI strengthens coordination and efficiency (El-Kassar & Singh, 2019) and contributes to the achievement of broader strategic objectives (Yams *et al.*, 2020). Artificial Intelligence (AI) has become especially revolutionary for small and medium corporations (SMEs). SMEs can improve decision-making, automate jobs, and extract insights from massive data sets by utilising technologies like machine learning, data analytics, and natural language processing. Evidence shows that integrating AI into SME operations leads to greater efficiency, cost reduction, and enhanced strategic agility (Iyelolu *et al.*, 2024).

2.5 Areas of artificial intelligence adoption in FOBs

Family-owned businesses (FOBs) have attracted significant scholarly and practical attention because of the crucial roles they play in national and global economies (Nnabuife *et al.*, 2019). Sustaining these businesses, however, has become increasingly tied to technological advancement, with artificial intelligence (AI) standing out as one of the most transformative tools available to support FOB operations across multiple dimensions. Upadhyay *et al.* (2023) argue that AI provides numerous benefits to small businesses, which constitute the majority of FOBs in Nigeria. By automating routine and repetitive tasks such as data entry, invoicing, and inventory management, AI contributes substantially to improved efficiency and productivity. In addition, Duan *et al.* (2019) highlight the capacity of AI to analyse large datasets and develop predictive models, thereby enhancing decision-making through real-time insights, which is an advantage particularly critical in sectors that demand rapid and accurate responses. AI has also reshaped the domain of customer engagement, as businesses increasingly rely on its tools to deliver personalised and efficient services. AI-driven solutions such as Chatbots provide quick and tailored responses, while the analysis of consumer data enables firms to offer customised recommendations that enrich the customer experience (Chen *et al.*, 2021). Beyond customer service, AI has proven valuable in optimising corporate functions such as supply chain management and human resources. According to

Torajipour *et al*. (2021), its predictive powers enhance demand forecasting, decrease inventory management inefficiencies, and lower operating expenses. In order to improve development prospects and long-term competitiveness, entrepreneurs can also use AI to predict customer wants, spot emerging market opportunities, and speed up innovation (Sawang & Kivits, 2023). It is often accepted that machine learning (ML), a subset of artificial intelligence, will revolutionise small and medium-sized businesses (SMEs). These technologies empower businesses to automate tasks, minimise operational risks, and strengthen decision-making processes. According to Nazia and Jenson (2024), AI and ML algorithms can examine extensive datasets, uncover hidden patterns, and predict future outcomes with remarkable accuracy. This provides SMEs and, by extension, FOBs with access to advanced data-driven insights that were once the preserve of larger corporations with greater resources. The advantages of these technologies are evident in enhanced efficiency, reduced risk, and greater organisational resilience. By replacing manual, repetitive tasks with AI-driven automation, employees are freed to focus on higher-value activities, ultimately resulting in significant savings in both time and resources (Nazia & Jenson, 2024).

2.6 Challenges to adopting AI in FOBs

Despite the well-documented benefits of artificial intelligence (AI) deployment and adoption in business operations (Rust, 2020; Vlacic *et al.*, 2021), small businesses, particularly those categorised as family-owned businesses (FOBs) continue to face considerable challenges in integrating AI into their activities. Kumar *et al.* (2020) argue that family firms, in particular, struggle with the adoption, improvement, and execution of modern innovations and technologies. While family enterprises increasingly acknowledge the growing relevance of digital transformation (Sawang & Unsworth, 2011), their unique structures and cultural dynamics often complicate the integration process. Resistance to change from older generations, limited digital competence, and concerns about preserving family traditions and legacy are some of the challenges that hinder their technological progress (Sawang & Kivits, 2023). Research has highlighted a range of barriers that impede AI adoption. Ullah *et al.* (2021) identified 21 critical obstacles, including the high cost of hardware and software, the complexity of technology deployment, and insufficient governmental incentives, funding, and regulatory support.

Adoption at the organisational level is further hampered by a lack of willingness to invest in digital solutions. Bérubé *et al*. (2021) divided the obstacles into three main groups: a lack of personal AI skills, broader operational challenges already mentioned in the literature on innovation, and insufficient organisational data-related capabilities. Similar findings were made by Lada *et al*. (2023), who found that organisational preparedness and managerial commitment are key elements in the effective adoption of AI, but external support and competitive pressure have less of an impact. The pre-, implementation, and post-implementation phases all present difficulties, according to Drmac (2022), which range from ill-defined use cases and a lack of experience to insufficient data and a failure to match with end-user requirements. Grunbichler (2023) further emphasised management, employee, organisational, and data-related issues, alongside external concerns such as weak infrastructure, a shortage of skilled labour, and limited knowledge of AI software products. At the same time, several drivers of AI adoption have been identified. The pursuit of increased productivity, organisational readiness, and leadership support are all emphasised by Shang *et al*. (2023). The absence of top-down support, high implementation and maintenance expenses, and a lack of qualified staff, on the other hand, continue to be major obstacles (Zavodna *et al*., 2024). For FOBs in particular, constrained financial resources, limited technical expertise, and weak access to external networks make adoption especially difficult (Hashi & Stojčić, 2013). SMEs more generally face challenges in handling the technical intricacies of integrating innovations into existing processes (Iyelolu *et al.,* 2024). Cross-country studies also shed light on these barriers. The adoption of AI was found to be substantially connected with technical compatibility, management capability, organisational readiness, government participation, market uncertainty, and vendor collaboration by Nguyen *et al*. (2022) in a study of Vietnamese firms. Similarly, Alsheiabni *et al.* (2019) reported that AI faces challenges similar to earlier technological advances, with firms identifying barriers such as insufficient in-house expertise, unclear business cases, weak leadership support, and shortages of skilled employees. These issues are often compounded by employee resistance to change. Sector-specific studies, particularly in healthcare, provide further evidence of the complexity of AI adoption. Technology, data, regulation, human resources, education, and culture are some of the barriers that Brennan (2022) identified. Chomutare *et al*. (2022) pointed out that while generalisability, system interoperability, and data quality are still issues, effective management and engagement are important

facilitators. Likewise, Paranjape (2021) pointed to financial constraints, insufficient clinical evidence, diverse stakeholder involvement, and privacy concerns as obstacles limiting AI uptake in healthcare contexts. While the potential of AI to enhance efficiency, decision-making, and competitiveness is widely acknowledged, the unique structure of FOBs, coupled with limited resources and cultural resistance, continues to make digital transformation a daunting undertaking.

2.7 Prospects for family-owned businesses pursuing artificial intelligence transition

Etele *et al* (2024) assert that businesses generally in developing economies, particularly across Africa, are currently at a critical juncture in the adoption of artificial intelligence (AI) within their operations. Evidence indicates that FOBs in Nigeria face mortality rates exceeding 80%, with many closing within five years due to succession challenges, resistance to change, limited innovation adoption, and structural weaknesses. Despite their vital contributions to socio-economic development, the survival of these enterprises beyond a single generation remains limited. AI presents a disruptive pathway for addressing these shortcomings by automating repetitive tasks, optimising supply chains, improving customer interactions through Chabot, and enabling data-driven strategies that strengthen operational sustainability across generational transitions. Both internal and external challenges continue to impede integration. Internally, FOBs often struggle with low levels of digital literacy among senior leaders, inadequate technological competence, and tensions between AI adoption and traditional family values. Externally, barriers include insufficient infrastructure, high costs of AI solutions, limited government support, and a shortage of skilled professionals. Kumar and Ratten (2024) highlight that although AI enhances competitiveness and sustainability in FOBs, infrastructural gaps and knowledge limitations remain significant barriers. Similarly, Tunçalp (2024) stresses the importance of aligning AI integration with family values, fostering intergenerational collaboration, and addressing cultural and ethical considerations. Saleem *et al*. (2023), in their study of German FOBs, found that adaptive resilience mediates the relationship between AI adoption and innovation, underscoring the need for both cultural and strategic readiness. Likewise, Lannon *et al.* (2023) emphasise the role of successors, particularly younger generations often referred to as “Generation AI”, who are more receptive to technological change and essential for ensuring continuity and driving progress. These

issues are especially acute in Africa, where structural weaknesses compound adoption challenges. Nwagbala *et al.* (2025) identified infrastructural deficits, unclear regulatory frameworks, and insufficient digital literacy as major barriers for SMEs, including FOBs. However, they argue that such challenges can be mitigated through supportive government policies, greater collaboration with educational institutions, and stronger partnerships with the private sector. Melina *et al.* (2024) link AI adoption to knowledge management, urging family firms to rethink how knowledge is transferred and integrated into digital processes. Similarly, Upadhyay *et al.* (2022) emphasise that entrepreneurial orientation and digital culture are critical enablers of AI adoption, requiring leaders of FOBs to adopt a proactive and forward-looking mindset. The long-term survival of FOBs in Africa hinges on fostering a digital mindset across generations, implementing targeted training to close knowledge gaps, and adopting scalable AI tools tailored to their cultural and operational contexts. Governments and development partners must play a supportive role by providing tax incentives, strengthening digital infrastructure, and offering accessible financing to ease adoption. Public–private partnerships and innovation hubs also offer opportunities for shared learning and access to advanced technologies. Importantly, FOBs themselves need to invest in change management strategies that integrate innovation without undermining family traditions and values. By embedding AI into their strategies, improving digital literacy, and leveraging the adaptability of younger generations, FOBs can transform from vulnerable enterprises into resilient organisations capable of achieving long-term sustainability and intergenerational continuity.

2.8 Empirical insights

Employee learning and skill development in AI-embedded organisations among employees in AI-driven technology enterprises were examined by Kumar and Mittal (2024). The study used snowball purposive sampling in a survey-based research approach. Structural Equation Modelling (SEM) was used for the statistical analysis. The relationship between AI trust, knowledge sharing, and AI skills was found to be positively mediated by employee learning, which enhanced AI employee collaboration. The study came to the conclusion that employee upskilling is facilitated by trust in AI, and it suggested that organisations offer AI training opportunities and promote information sharing to improve teamwork.

Nguyen *et al*. (2023) used an integrated Technology–Organisation–Environment (TOE) and Diffusion of Innovation (DOI) framework to study AI adoption in small and medium-sized businesses (SMEs). Partial Least Squares Structural Equation Modelling (PLS-SEM) was employed for analysis in a quantitative study design that was survey-based. The findings showed that organisational preparedness, external pressures, top management backing, and perceived benefits all had a substantial impact on AI adoption. The study came to the conclusion that SMEs' adoption of AI is influenced by both internal and external variables, and it suggested management and policy changes to improve AI readiness.

Tunçalp (2025) explored AI adoption in family firms, focusing on the interplay between tradition and innovation. The study adopted a qualitative multiple case study design, interviewing managers across several family-owned businesses. Thematic analysis was applied to the data. Findings showed that cultural values, intergenerational dynamics, and succession planning strongly shaped AI adoption. The study concluded that aligning AI integration with family values and promoting intergenerational collaboration enhances adoption and recommended embedding cultural and ethical considerations in digital transformation strategies.

A thorough analysis of the literature on AI adoption in SMEs was carried out by Dwivedi *et al*. in 2024. 155 peer-reviewed publications from 2010 to 2023 were examined in the study. The authors determined the main factors influencing and impeding adoption by bibliometric and content analysis. The results showed that although lack of experience, high costs, and infrastructure limitations impede adoption, organisational preparedness, competitive forces, and leadership support propel it. Future research on context-specific adoption models and policy support mechanisms is advised by the study's conclusion that the literature on AI adoption in SMEs is currently dispersed.

El-Kassar and Singh (2019) investigated AI adoption in supply chain management using survey data from SMEs in emerging economies. A quantitative design was applied, and data were analysed using regression modelling. Findings demonstrated that AI adoption improved supply chain visibility, efficiency, and decision-making accuracy. The study concluded that AI enhances competitiveness in SMEs' supply chains and recommended targeted investments in AI-driven supply chain technologies to sustain operational efficiency.

3 METHODOLOGY

The study population comprised managers of the selected family-owned firms. Managers were considered suitable participants given their strategic roles in decision-making, innovation adoption, and succession planning within the enterprises. One manager from each firm was interviewed, resulting in a total of five participants. Participants were coded as follows: P1 represented the manager from Innoson Technical & Industrial Company Ltd in Abia State; P2 was the manager from Chikason Group of Companies in Anambra State; P3 referred to the manager from Peace Mass Transit in Ebonyi State; P4 denoted the manager from Coscharis Group in Enugu State; and P5 represented the manager from Orange Drugs Limited in Imo State. A semi-structured interview guide was employed to enable participants to express their experiences and perspectives, while also allowing the researcher to probe specific areas relevant to AI adoption and sustainability. The data collected from the interviews, alongside secondary sources such as peer-reviewed journal articles, policy reports, and institutional publications, were subjected to thematic analysis. The analysis focused on four major themes: (1) the conceptual underpinnings of AI, (2) areas of AI adoption in FOBs, (3) challenges impeding AI integration, and (4) strategies for sustainable AI adoption. This approach ensured a structured interpretation of the findings, while also capturing the nuanced perspectives of managers who directly engage with the day-to-day realities of family business operations. However, the study provides valuable insights into the intersection of AI and FOB sustainability in Southeast Nigeria and offers a foundation for broader future empirical research.

Table 1:

Family-Owned Businesses and Their States of Operation in South-East Nigeria

S/N	NAMES OF THE ORGANISATIONS	Participant's code
1	Innoson Technical & Industrial Company Ltd in Abia	P1
2	Chikason Group of Companies in Anambra	P2
3	Peace Mass Transit in Ebonyi,	P3
4	Coscharis Group in Enugu	P4
5	Orange Drugs Limited in Imo.	P5

4 FINDINGS

The findings of the study revealed that managers of family-owned businesses (FOBs) in South-East Nigeria broadly understood Artificial Intelligence (AI) as a collection of digital tools designed to mimic human intelligence through functions such as decision-making, pattern recognition, prediction, and automation. Participants noted that a conceptual appreciation of AI was necessary for its successful use, as treating it merely as a "black box" solution could limit its effectiveness. Across the interviews, managers emphasised that AI could be applied in diverse areas of FOB operations, including automating repetitive administrative tasks such as payroll, invoicing, and inventory control, as well as enhancing customer management through Chabot and recommendation systems. They also highlighted its role in strategic decision-making, where AI-driven insights from historical data could inform procurement, marketing, and expansion strategies, while also supporting innovation, risk management, and supply chain optimisation. Despite these recognised benefits, several barriers were identified. Limited digital literacy, particularly among senior family members and long-serving employees, created significant knowledge gaps. Resistance to change, deeply rooted in cultural values and long-standing traditions, was also reported to slow down adoption. Managers further pointed out financial challenges associated with the high costs of AI software, hardware, and training, alongside infrastructural deficiencies such as unreliable electricity supply and poor internet connectivity. In addition, incomplete or disorganised datasets raised concerns around data management, while security and privacy issues further complicated integration. In terms of sustainable adoption, participants proposed deliberate strategies that emphasised capacity building, especially through continuous training and digital literacy initiatives for both management and staff. They suggested phased implementation beginning with low-risk applications, deliberate financial planning supported by external funding or government incentives, and structured change management to reduce resistance while aligning adoption with family values. Collaboration with academic institutions, technology providers, and professional networks was also considered essential to provide the technical expertise and innovative solutions needed to complement internal capacities.

4.1 Discussion of findings

How can Artificial Intelligence be leveraged to enhance the sustainability of Family-Owned Businesses (FOBs) in emerging economies? The analysis of participant interviews revealed four central themes regarding the integration of digital technologies, particularly Artificial Intelligence (AI), into Family-Owned Businesses (FOBs) for sustainability and growth in the 21st-century digital economy. These themes include the conceptual understanding of AI, specific areas where AI can be applied in FOB operations, the challenges that hinder its adoption, and the strategies required to ensure sustainable integration. Together, they provided valuable insights into how FOBs in emerging economies, especially in South-East Nigeria, perceive, adopt, and adapt to AI in their pursuit of long-term survival and competitiveness.

Theme 1: The Conceptual Underpinnings of AI

This theme emerged when participants were asked about their understanding of Artificial Intelligence (AI) and how it can influence the operations and sustainability of Family-Owned Businesses (FOBs). The use of computer systems to carry out tasks that would normally need human intelligence, such as automation, pattern recognition, prediction, and decision-making, was recognised by all five participants as the broad definition of artificial intelligence. They underlined that artificial intelligence (AI) is a group of technologies and methods, such as machine learning, natural language processing, and data analytics, that are intended to improve productivity and strategic decision-making. P4 explained that AI is akin to having a “digital assistant” capable of learning from data and providing actionable insights. He highlighted that in a family business context, AI can help track inventory, forecast sales trends, or even automate routine administrative tasks, allowing family members to focus on strategic planning and innovation. Similarly, P3 noted that AI essentially mimics certain human cognitive functions, such as problem-solving and pattern recognition. However, he cautioned that understanding the underlying principles, such as how algorithms learn from data and the importance of data quality, is critical for successful adoption. P5 provided a practical example: a family-owned pharmaceutical business uses AI to monitor stock levels, forecast demand for essential medicines, and identify potential market opportunities. By analysing historical sales data, AI systems can recommend optimal stock quantities and alert managers when reordering is necessary, thereby reducing waste and improving

operational efficiency. P5 further stressed that, while AI can significantly enhance decision-making, it is most effective when managers understand its conceptual foundations, how it learns, processes information, and generates insights rather than treating it as a "black box" solution. All participants agreed that conceptual understanding of AI forms the foundation for all subsequent applications in FOBs. Without appreciating what AI is, how it functions, and what it can realistically achieve, attempts to implement AI-driven systems are likely to fail or be underutilised. The participants emphasised that foundational knowledge allows businesses to identify where AI can provide the greatest value, anticipate challenges, and align technological adoption with family and organisational goals.

Theme 2: Areas of AI Adoption in FOBs

This theme emerged as participants were asked to identify specific areas within their family-owned businesses where Artificial Intelligence (AI) could be effectively integrated to enhance operations and sustain growth. All five participants agreed that AI has multiple applications across core business functions, including operations, customer management, decision-making, and strategic planning. P4 emphasised operational efficiency as a crucial issue, describing how AI might automate monotonous processes like order processing, payroll administration, and inventory management. AI frees up employees and family members to concentrate on high-value tasks like product creation and business expansion by decreasing manual labour. P4 also noted that this is particularly important in FOBs, where resources and manpower are often limited, and founders may be heavily involved in day-to-day operations. P3 emphasised AI's role in customer relationship management. He described how AI-driven tools, such as Chabot and recommendation engines, can personalise customer interactions, improve response times, and enhance overall satisfaction. For example, a family-owned transport company could use AI to provide real-time scheduling updates to clients, track vehicle locations, and predict demand patterns, thereby improving service delivery and operational reliability. P5 described strategic decision-making as another critical area of AI adoption. In his pharmaceutical business, AI is used to analyse historical sales data and market trends, generating predictive insights that guide procurement, marketing, and expansion strategies. This allows the business to anticipate market demand, reduce waste, and make informed investment decisions. Similarly, P2 noted that AI can aid risk management by identifying potential operational inefficiencies, supply chain disruptions, and financial

risks, enabling proactive intervention. P1 added that AI adoption is also useful in innovation and competitive intelligence. Artificial Intelligence can assist with research and development, product diversification, and judgments on new market entry by assessing consumer preferences, market trends, and rival strategy. As a group, the participants underlined that small and medium-sized family businesses may also use AI technologies to enhance customer satisfaction, decision-making, and efficiency, which would ultimately increase the sustainability of their operations. In conclusion, participants agreed that AI adoption in FOBs spans multiple areas—operations, customer engagement, strategic planning, risk management, and innovation. They stressed that the impact of AI is maximised when integrated into core business functions in a way that complements the skills of family members and aligns with the firm's long-term objectives.

Theme 3: Challenges Impeding AI Integration

This issue arose from conversations with participants about the obstacles preventing their family-owned businesses from using and successfully integrating artificial intelligence (AI). All five participants acknowledged that while AI offers significant advantages, several internal and external challenges limit its utilisation. P4 identified inadequate digital literacy as a major impediment. The technical knowledge and abilities needed to successfully implement and operate AI solutions are often lacking in senior family members and long-term workers. Because of this skills mismatch, there is a greater need for outside consultants or technology providers, which can raise expenses and cause implementation to lag. P3 highlighted resistance to change as a critical internal challenge. Family-owned businesses often have deeply entrenched practices and cultural norms, making it difficult for older generations to accept technological transformation. P3 explained that even when AI solutions are available, reluctance to depart from traditional methods can delay or prevent adoption. Financial constraints were emphasised by P5, who noted that high initial costs for AI software, hardware, and associated training present significant barriers, especially for small and medium-sized FOBs with limited capital. Without adequate investment, it is challenging to deploy AI systems that require continuous updates and technical support. P2 focused on infrastructure and technical support limitations, pointing out that unreliable electricity supply, poor internet connectivity, and insufficient IT infrastructure make the deployment of AI solutions difficult. Even when technology is available, these infrastructural deficiencies can

undermine performance and restrict the full potential of AI integration. Lastly, P1 highlighted challenges relating to data management and security. Many family businesses have incomplete or poorly organised datasets, which constrain the effectiveness of AI applications that rely on high-quality data for analysis and predictive modelling. Concerns regarding data privacy and regulatory compliance were also noted as factors that discourage full-scale AI adoption. In summary, the participants agreed that AI integration in FOBs is impeded by a combination of internal and external factors. Internally, inadequate digital skills, resistance to change, and financial limitations hinder adoption, while externally, poor infrastructure, lack of technical support, and data challenges further constrain implementation. Addressing these challenges is essential for unlocking the full potential of AI in sustaining family-owned businesses.

Theme 4: Strategies for Sustainable AI Adoption

This theme emerged from discussions with participants regarding practical approaches to ensure the effective and sustainable integration of Artificial Intelligence (AI) in family-owned businesses (FOBs). Participants highlighted strategies that balance technological innovation with the preservation of family values and operational continuity. P4 emphasised the importance of capacity building and digital literacy. He suggested implementing training programmes for both senior management and operational staff to enhance their understanding of AI systems, enabling them to leverage these tools for decision-making, operational efficiency, and strategic planning. Continuous upskilling was seen as essential to keep pace with technological advancements. P3 focused on incremental adoption of AI. He proposed starting with smaller, low-risk AI applications, such as automated invoicing, customer service Chabot, or inventory management systems, before scaling to more complex functions. This phased approach allows family businesses to adjust gradually, manage risks, and build internal confidence in AI technologies. Financial planning and access to funding were highlighted by P5, who stressed that sustainable AI adoption requires deliberate budgeting for initial costs, ongoing maintenance, and technological upgrades. Participants also suggested exploring government incentives, development grants, or partnerships with technology providers to reduce financial burdens and make adoption more feasible. P2 underscored the significance of change management and organisational readiness. Engaging family members, employees, and stakeholders early in the AI adoption process fosters acceptance, reduces resistance, and ensures alignment with the firm's values and

objectives. Establishing clear roles, responsibilities, and communication channels was recommended to facilitate smooth integration. Finally, P1 highlighted the importance of collaboration and knowledge sharing. He suggested that partnerships with academic institutions, technology firms, and industry networks can provide access to expertise, best practices, and innovative solutions. Leveraging external support not only mitigates internal knowledge gaps but also enhances the firm's capacity to adapt and innovate.

5 CONCLUSION

The study revealed that Artificial Intelligence (AI) presents a transformative opportunity for Family-Owned Businesses (FOBs) to enhance efficiency, decision-making, and long-term sustainability. From the thematic analysis, it is indicated that understanding the conceptual underpinnings of AI is crucial for managers to appreciate its potential and limitations. AI adoption in FOBs spans multiple operational areas, including automation, customer engagement, inventory and supply chain management, and data-driven strategic planning. However, the integration of AI is impeded by significant challenges, such as limited digital literacy among senior family members, high implementation costs, insufficient infrastructure, and resistance to change rooted in traditional family values. Despite these barriers, sustainable adoption of AI is achievable through deliberate strategies, including capacity building, phased implementation, financial planning, change management, and collaboration with external stakeholders. Managers emphasised that successful AI integration requires balancing technological innovation with the preservation of family-oriented practices and values. Overall, the findings suggest that when approached strategically, AI can serve as a vital tool for ensuring the continuity, competitiveness, and resilience of FOBs in emerging economies, particularly in contexts like South-East Nigeria.

5.1 Recommendations

To enhance the adoption and sustainable use of Artificial Intelligence (AI) in Family-Owned Businesses (FOBs) in emerging economies, managers and key decision-makers must engage in continuous training to improve digital literacy and AI competencies. Such capacity building will enable informed decision-making and reduce

resistance to technological adoption. The implementation of AI should be approached gradually, starting with high-impact areas such as inventory management, customer engagement, and financial tracking, allowing the business to adapt without disrupting existing processes. Financial support through government incentives, grants, and accessible loans can help mitigate the burden of high upfront costs associated with AI technologies. At the same time, structured change management practices that align technological adoption with the preservation of family values and culture are essential, fostering open communication and intergenerational engagement while addressing concerns about job displacement. Collaboration with technology providers, research institutions, and innovation hubs can provide FOBs with expertise, technical guidance, and customised solutions that suit their scale and context. Integrating AI should also be accompanied by deliberate knowledge transfer strategies, particularly involving younger family members who are technologically adept, to ensure continuity across generations. Finally, policymakers must prioritise the development of digital infrastructure, clear regulations, and supportive policies to create an enabling environment for AI adoption. Collectively, these measures will improve operational efficiency, enhance competitiveness, and strengthen the long-term sustainability of Family-Owned Businesses in emerging economies.

5.2 Limitations

The study was conducted within certain boundaries that should be considered when interpreting the findings. It focused on five managers drawn from family-owned businesses in South-East Nigeria, which offered rich contextual insights but did not claim statistical generalisability. The qualitative design was chosen to capture depth and nuance, though it naturally differs from large-scale quantitative approaches. In addition, the scope of the study was geographically limited to one region, and the rapidly evolving nature of Artificial Intelligence (AI) means that some perspectives may shift as technologies advance. Finally, while secondary data sources were used to complement interview findings, this reliance may reflect the perspectives available at the time of the research.

5.3 Suggestion for further research

Future studies could examine how AI adoption affects the long-term sustainability, performance, and intergenerational continuity of family-owned businesses in different African contexts.

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Authors' Contribution

Both authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

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