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Original Article

Empowering Kenyan SMEs: Leveraging Business Intelligence, Design Thinking, and AI for Sustainable Innovation: A Narrative Review

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ABSTRACT

The role of design in fostering innovation and creating a competitive advantage has garnered increasing interest among management scholars over time. Early perspectives on this topic were rooted in product and architectural design—spanning buildings, furniture, and clothing—where scholars argued that "thinking like a designer" could help address complex, "wicked problems". They proposed that organizations could maximize the benefits of this mindset by embedding design thinking into their structures and cultures. Despite these early theoretical insights, much of the initial empirical research on design approaches in organizations concentrated on the team level, outlining specific tools that enable teams to "think like designers." This research identified a structured problem-solving approach incorporating design tools such as rapid prototyping, user observation, idea visualization, and brainstorming. Over time, the application of these "designedly tools" across various organizational challenges led to the emergence of "design thinking" as a distinct discipline. While existing research on design thinking has largely focused on its practical applications in solving business problems. It has paid comparatively less attention to the broader advantages of integrating design as a core element of organizational culture. Design can foster innovation and generate a competitive advantage for organizations and has, over time, attracted increasing interest among management scholars. Building on frameworks of product and architectural design (e.g., the design of buildings, furniture, clothes), early proponents of this mind-set suggested that "thinking like a designer" to solve "wicked problems" could be best leveraged in organizations by "infusing" design into the fabrics and cultures of these organizations. Despite this initial theorizing, most early empirical studies of design approaches in organizations focused on the team level and defined the specific tools that these teams could use to "think like designers." This research identified a systematic approach to problem-solving that employs design tools such as rapid prototyping, user observation, visualization of ideas, and brainstorming. Over time, the use of such "designedly tools" to solve a wide variety of organizational problems evolved into a new discipline called "design thinking" Research on design thinking, thus, has traditionally emphasized the practical implications of using design tools to solve

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business problems but has largely overlooked the potential benefits of incorporating design as a key component of organizational culture.

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INTRODUCTION

In the literature on strategy, innovation, and entrepreneurship, the idea of an innovation ecosystem—which is based on the concept of a business ecosystem—has become more and more popular. Nevertheless, not all innovation ecosystems share the same internal cooperation or architectural patterns, and current research hardly ever dissects an innovation ecosystem and looks at its composition (Dias Sant´Ana, De Souza Bermejo, Moreira, & de Souza, 2020). Design thinking—an innovation framework increasingly adopted in the private sector—holds significant potential as a structured and recognizable approach for healthcare professionals. By integrating design thinking, healthcare management, innovation, and practice can benefit from more creative, interdisciplinary, and human-centred solutions at scale. Similarly, AI technologies provide three key advantages (Joyce, Paquin, & Pigneur, 2015). First, AI enables the automation of repetitive and time-consuming tasks, allowing professionals to focus on higher-value work. Second, AI unlocks insights from vast amounts of unstructured data—such as videos, images, written reports, business documents, social media posts, and emails—that previously required extensive human effort to analyze. Third, AI facilitates the coordination of thousands of computing resources to solve highly complex problems. Given these capabilities, AI should be leveraged to develop innovative solutions for mitigating the climate crisis. However, achieving this requires rigorous research to understand how AI-driven approaches can effectively integrate human emotions, cognition, social norms, and behavioural responses (Nishant, Kennedy, & Corbett, 2020; Sreenivasan, & Suresh, 2024).

Human-Centred AI (HCAI) is a promising direction for designing AI systems that support human self-efficacy, promote creativity, clarify responsibility, and facilitate social participation. These human aspirations also encourage consideration of privacy, security, environmental protection, social justice, and human rights. This commentary reverses the current emphasis on algorithms and AI methods, by putting humans at the centre of systems design thinking. It presents three key ideas. First, it introduces a two-dimensional Human-Centered AI

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(HCAI) framework, demonstrating that high levels of human control and high levels of automation can coexist. Second, it advocates for a shift from merely emulating human intelligence to actively empowering people. This includes a call to change the language, imagery, and metaphors used in AI discussions—moving away from depictions of intelligent autonomous teammates and instead framing AI as powerful tool-like appliances and tele-operated devices. Finally, it proposes a three-level governance structure. This structure outlines how software engineering teams can build more reliable systems, how managers can foster a safety-oriented organizational culture, and how industry-wide certification can help establish trust in HCAI systems (He, & Ortiz, 2021). These ideas will be challenged by some, refined by others, extended to accommodate new technologies, and validated with quantitative and qualitative research. They offer a reframe -- a chance to restart design discussions for products and services - which could bring greater benefits to individuals, families, communities, businesses, and society (Shneiderman, 2020; Kurek, 2023).

AI has revolutionized business analytics by enabling organizations to leverage vast amounts of data for informed decision-making. By employing machine learning algorithms and predictive analytics, businesses can identify trends, forecast outcomes, and optimize operations with unprecedented accuracy. AI technologies enhance data analysis capabilities by automating routine tasks, providing deeper insights into customer behaviour, and uncovering hidden patterns within datasets. As a result, organizations can make data-driven decisions that lead to improved operational efficiency and strategic growth (Badmus, Rajput, Arogundade, & Williams, 2024). Business Intelligence (BI) systems are now extensively utilized across various business domains that rely on data-driven decision-making to create value. BI involves processing available data to extract, analyze, and predict business-critical insights. Traditionally, BI has focused on collecting, extracting, and organizing data to enable efficient and professional query processing for deriving insights from historical data. However, with the advent of big data, the Internet of Things (IoT), artificial intelligence (AI), and cloud computing (CC), BI has become even more critical, attracting significant interest from both industry and academia (Gad-Elrab, 2021; Kankaew, et.al., 2024). AI-enabled intelligent systems have become essential for organizations seeking to survive and thrive in an era of relentless competition, driven by accelerating globalization and an expanding array of disruptive technologies (Warner & Wäger, 2019). Major industries—including finance, healthcare, manufacturing, retail, supply chain management, logistics, and utilities—are increasingly adopting advanced analytics, with many experiencing transformative disruptions from machine learning (ML) and AI-based applications (Dwivedi et al., 2021; Schmitt, 2020). In today's fast-paced, highly competitive global market, data-driven decision-making powered by AI and ML has become indispensable (Davenport, 2018). Business analytics plays a crucial role in facilitating this new approach to decision-making, as it integrates multiple disciplines, including machine learning, statistics, information systems, operations research, and management science (Sharda, Delen, & Turban, 2017). Typically, business analytics is categorized into three main types: descriptive, predictive, and prescriptive analytics (Delen & Ram, 2018).

Small businesses are a driving force behind innovation and economic growth, serving as the backbone of Kenya's economy by contributing 33.8% of the national output (KNBS Economic Survey, 2022). According to Muturi (2015), small businesses play a crucial role in introducing new ideas, products, and services to the market while creating job opportunities for individuals with specialized skills. Their success fosters a competitive and dynamic business environment that attracts investment and stimulates economic development. However, small businesses in Kenya face significant challenges, leading to a high rate of

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failure. The 2016 Micro, Small, and Medium Enterprises (MSMEs) survey revealed that 46.3% of small businesses shut down within their first year of operation. This alarming statistic highlights the difficulties these enterprises encounter, despite their critical role in the economy (KNBS, 2016). Recognizing the importance of MSMEs, Sustainable Development Goal (SDG) 8 emphasizes their contribution to eradicating poverty, ending hunger, and creating decent employment opportunities. Similarly, Kenya's Bottom-up Economic Transformation Agenda (BETA) envisions the MSME sector as a key driver of job creation and economic empowerment, particularly for marginalized groups. To support the growth of MSMEs, the government has implemented various initiatives aimed at fostering a conducive business environment. However, despite these efforts, the 2016 MSME survey indicated that nearly half of small businesses still fail within their first year. Strengthening support for small businesses is crucial for enhancing employment opportunities, increasing national output, reducing poverty levels, and attracting further investment into the country (Kenya Economic Report, 2022)

Triple-Layer Innovation Framework for Kenyan SMEs

As interrelated layers that propel sustainable innovation in SMEs, this approach integrates Business Intelligence (BI), Design Thinking (DT), and Artificial Intelligence (AI). Artificial intelligence (AI) is greatly improved by business intelligence (BI), which contributes structured data that makes AI models more accurate and dependable. By providing insightful consumer data that helps improve data strategies and guarantee that the information acquired is both pertinent and actionable, Digital Transformation (DT) in turn enhances and improves BI. In this interrelated cycle, AI improves DT even more by facilitating automation, which speeds up procedures like testing and prototyping. Sustainable innovation, fuelled by data, human needs, and brilliant automation techniques, is the result of this integrated strategy. (Basile, 2021). A thorough framework for assessing and creating sustainable business models is the Triple Layer Innovation Theory, which is frequently linked to the Triple Layered Business Model Canvas. By adding two more layers that emphasise social and environmental aspects in addition to the economic one, it expands on the conventional Business Model Canvas. With the help of this multi-layered approach, businesses can visualise and evaluate the wider effects of their operations, leading to more impactful, sustainable, and responsible innovation (Joyce, & Paquin, 2016; Qu, & Kim, 2025; Midgley, & Arya, 2022).

The SME Digital Innovation Cycle (SDIC)

The above framework describes a cyclical approach that integrates artificial intelligence (AI), digital transformation (DT), and business intelligence (BI) to help Kenyan SMEs achieve continual improvement. Fundamentally, the cycle encourages sustained growth and adaptive innovation. The first step in the process, which is fuelled by digital transformation, is problem identification. At this point, companies understand the practical difficulties that SMEs encounter, concentrating on consumer problems and identifying areas for innovation. The data exploration stage comes next, during which market and operational data are gathered and examined using BI tools. Decision-making is aided by the strategic insights and trends this study reveals (Ramdani, Raja, & Kayumova, 2022 ; Sassanelli, Terzi, Panetto, & Doumeingts, 2021).

SMEs in Kenya

Small and Medium Enterprises (SMEs) are the backbone of the Kenyan economy, significantly contributing to employment, innovation, and overall economic growth. They constitute about 98% of all businesses in Kenya, generate a substantial portion of the country's Gross Domestic Product (GDP), and employ over 80% of the workforce. In Kenya, an SME is defined as a business with annual sales

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of less than Ksh. 1 million. Micro-enterprises have less than ten employees, while small enterprises have 10-49 employees. Medium enterprises employ between 50-99 people. These SMEs are typically owned and managed by individuals or small groups, often operating informally with limited resources. However, their resourcefulness drives innovation, leading to the development of unique products and services. Small and Medium Enterprises (SMEs) are the backbone of Kenya's economy, driving growth, innovation, and opportunity across the nation. As the largest employers in the country, they play a pivotal role in job creation, absorbing a significant portion of the youth population and helping to curb unemployment. Beyond providing livelihoods, SMEs contribute approximately 40% of Kenya's GDP—a figure projected to rise to 50% in the coming years, underscoring their expanding influence. What sets SMEs apart is their dynamic spirit of innovation and entrepreneurship. From fintech to agribusiness and e-commerce, these enterprises are at the forefront of developing cutting-edge solutions that address local challenges while tapping into global markets. Their versatility also fosters economic diversification, reducing Kenya's reliance on traditional sectors and strengthening resilience against external shocks. Moreover, the rise of digital lending platforms has revolutionized financial inclusion for SMEs, granting them much-needed access to credit. This empowerment allows small businesses to scale operations, enhance productivity, and compete more effectively in an ever-evolving marketplace. With their far-reaching impact, SMEs are not just economic contributors—they are the engines of Kenya's sustainable development and prosperity. Small and Medium Enterprises (SMEs) form the lifeblood of Kenya's economic ecosystem, serving as catalysts for employment, innovation, and inclusive growth. As the country's largest employers, they provide livelihoods for millions, particularly the youth, helping to alleviate unemployment and foster socioeconomic stability. Their significance extends beyond job creation—SMEs contribute an estimated 40% of Kenya's Gross Domestic Product (GDP), with projections suggesting this figure could rise to 50% in the near future, reflecting their expanding influence in driving national prosperity (Kiarie, & Ndedda, 2021).

Renowned for their agility and creativity, Kenyan SMEs are pioneers of innovation, particularly in high-growth sectors such as fintech, agribusiness, and e-commerce. By developing localized solutions with global relevance, they not only meet domestic demands but also position Kenya as a competitive player in regional and international markets. Furthermore, their presence across diverse industries reduces the economy's dependence on traditional sectors, enhancing resilience against market fluctuations and external shocks. Financial inclusion has also been a game-changer for SMEs, thanks to the proliferation of digital lending platforms (CBK, June 4,2025). These tools have democratized access to credit, enabling small businesses to secure capital for expansion, technology adoption, and operational efficiency. As a result, SMEs are better equipped to scale sustainably, boosting productivity and contributing to a more dynamic and inclusive economy. In essence, SMEs are far more than economic actors—they are the cornerstone of Kenya's development, embodying the entrepreneurial spirit that propels the nation forward. Supporting their growth is not just an economic imperative but a pathway to shared prosperity and long-term resilience.

Government and Private Sector Initiatives Supporting SMEs in Kenya

Recognizing the pivotal role of Small and Medium Enterprises (SMEs) in Kenya's economic growth, both the government and private sector have rolled out targeted initiatives to foster their development, enhance access to finance, and improve competitiveness. At the forefront of these efforts is the Credit Guarantee Scheme (CGS), a government-backed program designed to mitigate lending risks

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for financial institutions, thereby encouraging increased credit flow to MSMEs (RoK, 2024). By guaranteeing a portion of loans, the CGS has significantly improved SMEs' access to much-needed capital. Complementing this is the State Department for MSME Development, which serves as the central coordinating body for SME-related policies and programs. Its mandate spans policy formulation, financing solutions, capacity building, and market development, ensuring a holistic approach to SME growth (RoK, 2024). To further enhance financial inclusion, the government launched the Hustler Fund, a dedicated financial facility offering affordable credit to SMEs and individuals at the grassroots level. This initiative has empowered small businesses with working capital, enabling them to expand operations and improve productivity. Additionally, Kenya Industrial Estates (KIE) plays a crucial role by providing tailored financial products, business development services, and industrial infrastructure, fostering an enabling environment for MSMEs to thrive ((KIE, 2024). Similarly, the Micro and Small Enterprises Authority (MSEA) is tasked with promoting, regulating, and supporting micro and small enterprises, ensuring their integration into the formal economy.

On the private sector front, the Kenya Private Sector Alliance (KEPSA) actively advocates for SME-friendly policies while offering training, capacity-building programs, and facilitating access to finance and markets. Meanwhile, the United SMEs Association of Kenya serves as a vital networking platform, connecting SMEs with resources, training, and business opportunities to spur growth and sustainability. Through these collaborative efforts, Kenya is building a robust ecosystem that empowers SMEs—driving innovation, employment, and economic resilience for long-term prosperity.

Strategic Necessities for Kenyan SMEs in the Global Marketplace

For Kenyan small and medium enterprises (SMEs) to thrive in international markets, they must adopt a strategic orientation that prioritizes several critical success factors. First and foremost is the development of comprehensive global market strategies, supported by rigorous market research to gather valuable foreign market intelligence. This foundational work must be complemented by sustained investments in innovation and technology adoption to enhance competitiveness. Equally important is the need for product adaptation to meet diverse international standards and consumer preferences, coupled with a strong service orientation that builds customer loyalty across borders. Kenyan SMEs should actively pursue collaborative ventures and strategic partnerships that can provide access to new markets and technologies. Perhaps most crucially, they must cultivate a long-range vision that anticipates global trends and positions them for sustainable international growth (Abbey & Adu-Danso, 2023). In today's interconnected global economy, success increasingly depends on effective participation in production and innovation networks. Kenyan SMEs need to develop the capability to interact seamlessly with other firms - whether as equals in tightly-knit partnerships or as agile participants in broader value chains. This network competence will be vital for navigating the complexities of modern globalization and securing a competitive advantage in international markets (Osano, 2019). In today's competitive business landscape, innovation has emerged as a critical driver of firm competitiveness. Recognizing this, both small and medium enterprises (SMEs) and policymakers have placed innovation at the heart of business strategies and government economic policies (Kiveu, Namusonge, M., & Muathe, 2019; Naradda et al., 2020). Small and Medium Enterprises (SMEs) are indispensable to the industrial ecosystems of both developed and developing economies, serving as dynamic engines of growth in today's globalized world. Beyond their economic significance, SMEs are vital to advancing human well-being, particularly in underserved

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communities. Empirical evidence underscores their dominance: SMEs constitute approximately 90% of all businesses worldwide and employ nearly 60% of the global workforce. Their contributions extend far beyond job creation—they are pivotal in driving poverty reduction, fostering sustainable economic development and promoting equitable progress (ICSB,2024).

Nowhere is this impact more pronounced than in rural economies, where SMEs act as catalysts for local development. By generating employment and empowering marginalized groups—including women, persons with disabilities, low-income households, and the informally educated—SMEs directly combat poverty, inequality, and unemployment. Their inclusive business models align with the United Nations Sustainable Development Goals (SDGs), particularly in fostering equitable growth and reducing disparities. Consequently, policymakers globally recognize SMEs as indispensable tools for addressing systemic challenges, especially in rural revitalization. The transformative potential of SMEs is further evidenced by their ability to uplift vulnerable populations. As Park, El Sawy & Fiss, (2017**)** highlight, SME growth correlates strongly with poverty alleviation, job creation, and improved living standards—particularly through self-employment opportunities and wage increases for women and disadvantaged groups. By integrating SMEs into national development strategies, countries can harness their dual potential: as economic powerhouses and as vehicles for social equity (Masroor, & Asim,2019).

Promoting Gender Equality and Financial Inclusion for Women in SMEs: A Multidimensional Approach

Achieving gender equality and financial inclusion for women—particularly within Small and Medium Enterprises (SMEs) in Kenya and globally—demands a comprehensive strategy that tackles systemic barriers while cultivating an inclusive economic ecosystem. This requires coordinated efforts across legal, financial, educational, cultural, and technological spheres. Legal and regulatory reforms form the foundation of this transformation. Discriminatory laws surrounding property ownership, inheritance rights, and business registration must be overhauled to grant women equal access to collateral and entrepreneurship opportunities. Kenya's historical land ownership barriers, for instance, have long constrained women's ability to secure loans, underscoring the urgency of such reforms. Concurrently, simplifying bureaucratic business registration processes can alleviate disproportionate burdens on women, who often juggle enterprise development with household responsibilities. Public and private sector actors can further accelerate progress through gender-responsive procurement policies. Kenya's Access to Government Procurement Opportunities (AGPO) initiative exemplifies this approach by reserving 30% of public tenders for underrepresented groups, including women-owned enterprises (Alliance for Financial Inclusion, 2024).

To enhance financial access, tailored solutions must address women's unique challenges. Financial institutions should design products with flexible collateral requirements, such as group guarantees or movable asset financing, while mobile-based credit platforms like Kenya's M-Shwari demonstrate how technology can bridge gaps in working capital access. Dedicated funding mechanisms—such as the Women Enterprise Fund—and gender-lens investing models can further channel resources toward women-led SMEs, ensuring they receive equitable opportunities to scale. Capacity-building initiatives are equally critical. Targeted training programs in business management, financial literacy, and digital skills—delivered through accessible platforms like the HerVenture mobile app—can empower women to navigate formal economies confidently. Complementing this with networking opportunities fosters connections to mentors, markets, and investors, creating ecosystems where women entrepreneurs thrive (Alliance for Financial Inclusion, 2024). Yet

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financial and educational interventions alone are insufficient without addressing socio-cultural barriers. Community-driven campaigns to challenge gender norms must run parallel with efforts to elevate women into leadership roles within financial institutions and business networks, ensuring their perspectives shape inclusive policies. Technology serves as a powerful equalizer in this endeavor (KIE, 2024; Zaverzhenets, & Łobacz, 2021). Digital financial services (DFS)—including mobile money and agent banking—can circumvent physical banking barriers, while fintech innovations like digital lending platforms can cater specifically to women's entrepreneurial needs. Finally, robust data collection is vital to measure progress. Sex-disaggregated data illuminates gap in financial access and pinpoints which interventions deliver tangible impact, enabling evidence-based policymaking. By integrating these approaches—legal empowerment, financial innovation, skills development, cultural shift, technological leverage, and data-driven accountability—SMEs, governments, and investors can collectively dismantle barriers to women's economic participation. Kenya's pioneering efforts in mobile money and procurement inclusion offer a blueprint, but global collaboration remains essential to scale these solutions and unlock the full potential of women entrepreneurs worldwide (CGAP, 2025; Maurer, 2021). SMEs are integral to Kenya's economic prosperity, driving growth, creating jobs, and fostering innovation. While they face significant challenges, the government and private sector are increasingly providing support to help them thrive. By addressing the challenges and leveraging available resources, Kenyan SMEs can further enhance their contribution to the nation's development and achieve sustainable growth (KIE, 2024).

Integration of Artificial Intelligence (AI), Design Thinking, and Business Intelligence (BI)

The integration of Artificial Intelligence (AI), design thinking, and business intelligence (BI) presents a transformative pathway for fostering organizational innovation within small and medium-sized enterprises (SMEs), both in Kenya and across the globe. These three pillars, when combined, create a synergistic framework that empowers SMEs to navigate complex challenges, seize emerging opportunities, and drive sustainable growth. Here's a deeper exploration of how these elements intertwine to unlock innovation and competitiveness. AI serves as a cornerstone for modernizing operations and enhancing decision-making (Babatunde, 2024). By automating repetitive tasks, AI liberates valuable resources, allowing SMEs to focus on strategic initiatives. For instance, AI-powered chatbots can revolutionize customer service by providing instant, round-the-clock support, while automated data entry systems reduce human error and save time. Similarly, AI-driven inventory management ensures optimal stock levels, minimizing waste and maximizing efficiency (Pham, & Dell'Era, 2022; Gad-Elrab, 2021). Beyond automation, AI excels in data analysis, sifting through vast datasets to uncover patterns and trends that might otherwise remain hidden. This capability enables SMEs to make data-driven decisions in areas such as marketing, sales, and product development. Predictive analytics, a subset of AI, further empowers businesses to anticipate market shifts and adapt proactively. Additionally, AI enhances customer experiences by personalizing interactions. By analyzing customer behaviour and preferences, AI can tailor recommendations, offers, and communications, fostering deeper customer loyalty and driving sales (Sayed, 2023; Beckman, & Barry, 2007).

Design thinking complements AI by placing the human experience at the heart of innovation. This methodology emphasizes understanding customer needs, pain points, and aspirations, ensuring that solutions are not only technologically advanced but also deeply relevant. For SMEs, this means developing products and services that resonate with their target audience, thereby increasing adoption and satisfaction. Design thinking also encourages

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rapid prototyping and iterative testing, allowing businesses to experiment with new ideas without the fear of costly failures. This agile approach accelerates the innovation cycle, enabling SMEs to bring solutions to market faster. Moreover, design thinking provides a structured yet creative framework for problem-solving, helping SMEs tackle complex challenges with innovative and user-centric solutions (Pham, & Dell'Era, 2022; Sayed, 2023).

BI tools act as the bridge between data and actionable insights. By collecting, analyzing, and visualizing data, BI empowers SMEs to monitor key performance indicators (KPIs) and make informed decisions. This data-driven approach ensures that businesses can identify areas for improvement, track the impact of innovation initiatives, and optimize their operations. BI also plays a critical role in market analysis, helping SMEs identify emerging opportunities and potential threats. By staying ahead of market trends, SMEs can position themselves competitively and respond swiftly to changing dynamics. The true potential of these elements lies in their integration. AI generates the data that BI tools analyze, creating a feedback loop that continuously refines decision-making. Design thinking, in turn, guides the development of AI-powered solutions, ensuring they are aligned with customer needs and expectations. Meanwhile, BI tracks the effectiveness of these initiatives, providing measurable insights into their impact. Together, these components form a cohesive ecosystem that drives innovation from ideation to execution (Tantiyaswasdikul, 2023).

For Kenyan SMEs, the adoption of AI, design thinking, and BI comes with unique considerations. Accessibility is paramount; these technologies must be affordable and user-friendly to ensure widespread adoption. Skills development is equally critical, as SMEs require training and support to harness these tools effectively. Additionally, improving digital infrastructure, such as reliable internet connectivity, is essential to enable seamless integration and utilization of these technologies. By strategically leveraging AI, design thinking, and business intelligence, SMEs in Kenya and beyond can unlock unprecedented opportunities for innovation, growth, and competitiveness. This integrated approach not only enhances operational efficiency and customer satisfaction but also positions SMEs to thrive in an increasingly dynamic and data-driven global economy. The future of organizational innovation lies in the harmonious fusion of technology, creativity, and insight—a future that is well within reach for SMEs willing to embrace these transformative tools (Wakiaga, 2025).

How Design Thinking and Business Intelligence Intertwine to Unlock Organizational Innovation?

Design thinking and business intelligence (BI) are two powerful methodologies that, when intertwined, create a robust framework for unlocking organizational innovation. Together, they bridge the gap between human-centred creativity and data-driven decision-making, enabling organizations to develop solutions that are both innovative and impactful. Design thinking begins with empathy—a deep understanding of customer needs, pain points, and aspirations. This human-centred approach ensures that innovation is rooted in real-world problems and opportunities. Business intelligence, on the other hand, provides the data and analytics needed to validate these insights. By combining qualitative observations from design thinking with quantitative data from BI, organizations can gain a holistic understanding of their customers and markets (Schmitt, 2023). For example, design thinking might uncover a customer need for faster service delivery, while BI can analyze data to identify bottlenecks in the current process and quantify the potential impact of addressing them. Design thinking emphasizes rapid prototyping and iterative testing, allowing organizations to experiment with new ideas quickly and cost-effectively. BI enhances this process by

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providing real-time data on how these prototypes perform. For instance, if an SME develops a new product feature based on customer feedback, BI tools can track user engagement, satisfaction, and sales metrics to determine its success. This data-driven feedback loop enables organizations to refine and improve their innovations iteratively, reducing the risk of failure and accelerating time-to-market (Mohammadian, 2022). Design thinking encourages creative problem-solving by challenging assumptions and exploring diverse perspectives. However, creativity alone can lead to solutions that are imaginative but not necessarily viable or impactful. BI grounds this creativity in evidence by providing actionable insights into market trends, customer behaviour, and operational performance. For example, design thinking might generate ideas for a new marketing campaign, while BI can analyze past campaign data to identify which strategies are most likely to resonate with the target audience. This combination ensures that innovative solutions are both imaginative and practical (Lateef, & Keikhosrokiani, 2023).

Design thinking often focuses on solving specific customer problems, but without a clear understanding of organizational priorities, these solutions may not align with broader business objectives. BI helps bridge this gap by providing visibility into key performance indicators (KPIs) and organizational goals. For instance, if an SME's goal is to increase customer retention, design thinking can generate ideas for improving the customer experience, while BI can track retention rates and identify which initiatives are most effective (Badghish, & Soomro, 2024). This alignment ensures that innovation efforts contribute directly to the organization's strategic objectives (Kurtmollaiev, et al., 2018). One of the challenges of innovation is measuring its impact. Design thinking encourages experimentation, but without data, it can be difficult to determine whether a new idea is truly successful. BI provides the tools to measure and analyze the outcomes of innovation initiatives. For example, if an SME implements a new customer service process based on design thinking principles, BI can track metrics such as response times, customer satisfaction scores, and repeat purchase rates to evaluate its effectiveness (Roberts, et.al., 2016; Gad-Elrab, 2021). This data-driven approach ensures that innovation efforts are not only creative but also results-oriented. Design thinking thrives on collaboration and cross-functional teamwork, bringing together diverse perspectives to solve complex problems. BI enhances this collaboration by providing a shared foundation of data and insights. For example, during a design thinking workshop, teams can use BI dashboards to visualize customer data, market trends, and operational performance, ensuring that all participants are working from the same information. This alignment fosters more informed and cohesive decision-making, leading to more effective and innovative solutions (Mesa, et al., 2022).

System processing involves handling incoming data, big data analysis, and system evaluation after data clustering, leading to intelligent decision-making. This process can be fully executed through the Internet of Things (IoT), Artificial Intelligence (AI), Business Intelligence (BI), and emerging fourth-generation technologies. The rapid advancements in data processing directly influence consumer choices (Mohammadian, 2022). Drawing from the 5th Wave, i-Sustainability Plus, and Doost Cultural Theory (DCT), along with models such as SME 5.0/Hybrid SMEs/Tomorrow's SMEs, the Seven Pillars of Sustainability (7PS), the Nine Pillars of Sustainable Governance (9PSG), and the 3D Socio-Eco-Environmental SME model—developed by Hamid Doost Mohammadian between 2010 and 2017—these frameworks provide a foundation for a holistic approach to Industry 4.0 implementation. By integrating these theories, models, and concepts, a comprehensive toolkit emerges to support the development of tomorrow's SMEs and ensure a sustainable and intelligent digital transformation (Mohammadian, 2022; Bigdeli, et al., 2020).

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Innovation is not a one-time event but an ongoing process. Design thinking promotes a culture of continuous improvement by encouraging organizations to iterate and refine their solutions. BI supports this process by providing ongoing data and analytics to monitor performance and identify areas for further innovation. For example, an SME might use design thinking to develop a new loyalty program, and BI can track its impact over time, providing insights into how it can be optimized for even greater results (Ponis, 2013). The interaction between design thinking and business intelligence creates a powerful synergy that drives organizational innovation. Design thinking ensures that solutions are human-centred, creative, and empathetic, while BI provides the data-driven insights needed to validate, refine, and scale these solutions. Together, they enable organizations to innovate with confidence, aligning creative problem-solving with measurable impact. For SMEs, this combination is particularly valuable, as it allows them to compete more effectively in dynamic markets by delivering solutions that are both innovative and grounded in reality. By embracing the integration of design thinking and BI, organizations can unlock new opportunities for growth, differentiation, and long-term success (Manzke, 2022).

Manufacturing is a vital economic driver, offering the dual benefit of absorbing large numbers of workers into productive, well-paying jobs and creating robust value chains that spur new business opportunities. Small and medium-sized enterprises (SMEs) play a pivotal role in this sector, not only by generating employment but also by fostering innovation and supporting the broader manufacturing ecosystem. A recent National Economic Survey report by the Central Bank of Kenya (CBK), SMEs account for 98 percent of all businesses in Kenya, contribute 30 percent of annual job creation, and make up 3 percent of the country's GDP. Despite their significant role in driving economic growth, SMEs' contribution to overall production remains relatively low (CBK, 2024). A key challenge is that many small businesses operate within the informal economy. While this may provide short-term relief, it ultimately hinders their long-term growth potential. Informal operations limit SMEs' access to broader markets, resources, and opportunities, thereby constraining their ability to scale and maximize their socio-economic impact (Wakiaga, 2025; Basit, et al, 2024).

Design thinking comprises an approach to problem-solving that uses tools traditionally utilized by designers of commercial products, processes, and environments (e.g., designing a new car or the layout of a new airport). While design thinking was originally introduced as an approach that would work best when infused into the culture of an organization, earliest studies of design thinking focused on identifying the specific tools and methods that might be used to solve management problems (Elsbach, & Stigliani, 2018). The adoption of the design thinking approach (DTA) within organizations is crucial for generating creative and innovative solutions to complex business and societal problems. However, the integration of DTA into organizational practices is progressing slowly and needs immediate attention. Numerous interrelated and interdependent barriers hinder the integration of DTA into organizational practices (Kabra, & Mukerjee, 2025). Design thinking (DT) is gaining ground among academics and practitioners as a means to improve the innovativeness of organizations. However, with few exceptions, DT studies are most entrenched in practice rather than theory-driven research (Magistretti, Ardito, & Messeni Petruzzelli, 2021).

Interest in how designers work and think has progressively moved from the purview of industrial design to the broader management field. Indeed, "designedly thinking" and "designedly tools" (human centeredness, prototyping and experimentation, storytelling and engagement, and the bring-build-buy map) can help non-designers for example managers, R&D staff, policymakers

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address wicked and ill-formulated challenges that go beyond traditional design issues (Magistretti, et.al., 2021; Dragičević, et.al., 2023). This logic evolved into a new problem-solving approach called design thinking (DT). More formally, founded on designers' sensibility and methods, DT can be conceived as a way of framing, reframing, and enacting actions to solve various problems by harmonizing user desirability, economic viability, and technological feasibility (Lee, Ostwald, & Gu, 2020). Numerous domains have benefited from DT applications, such as education, as in the case of the development of (new) learning initiatives, facilitating meetings and improving the efficiency of workshops, aligning stakeholders in strategic planning, and policymaking to better manage complexity (Ben, et al., 2016; Park, et al., 2017). Organizations can leverage business intelligence and analytics (BI&A) to transform themselves through a holistic integration process. Contrary to this proposition, many organizations implement BI&A without aligning or integrating it with organizational strategies. Some implement BI&A in a very ad hoc manner without any plans to leverage it (Ramakrishnan, et al., 2020; Cubric, & Li, 2024).

Innovation is critical to business success, which increasingly relies on sustainable innovation**.** Recent best practices in innovation reveal the emergence of a new paradigm. Building an innovative ecosystem has a multilayered impact: it drives regional digitalization, fosters the growth of technological startups, promotes open innovation, and enhances new policies that, in turn, strengthen the system (Ben, et al., 2016). To support this, public policy must create open innovation environments aligned with the quintuple helix model**,** which harmonizes the ecosystem to internalize emerging spillovers. The public sector plays a vital role in this process by providing a robust legal framework, facilitating innovation procurement, and sharing risks in research and development (R&D). By unlocking the potential of community, academic, industry, and government collaboration, we can harness the collective and collaborative power of individuals to create a brighter, more sustainable future. (Costa, & Matias, 2020). The sustainable development of nations hinges on the implementation of long-term strategies and actions. In this endeavour, society must play a pivotal role as a key partner in decision-making processes. Research highlights the interconnected nature of the Sustainable Development Goals (SDGs), which introduces complexity and uncertainty, thereby complicating decision-making. To address these challenges, the Quintuple Helix of Innovation Model (QHIM) offers a robust analytical framework for understanding the interactions within these systems. The primary motivation for this study stems from the need to explore the relationships between the variables influencing the SDGs (Barcellos-Paula, De la Vega & Gil-Lafuente, 2021).

The Quadruple and Quintuple Helix Innovation Frameworks provide a comprehensive model for analyzing the interactions among universities, industry, government, the public, and the environment within a knowledge-based economy. Initially conceptualized by Henry Etzkowitz and Loet Leydesdorff, the innovation helix framework has become a cornerstone in the fields of innovation economics and knowledge theory, including the study of knowledge societies and economies. In this framework, each sector is represented as a helix (or circle), with overlaps illustrating their interactions and synergies. The Quadruple Helix was first introduced by Elias G. Carayannis and David F. J. Campbell in 2009, followed by the Quintuple Helix in 2010, which expanded the model to include environmental considerations (Carayannis & Campbell, 2019; Carayannis, Campbell, & Grigoroudis, 2022).

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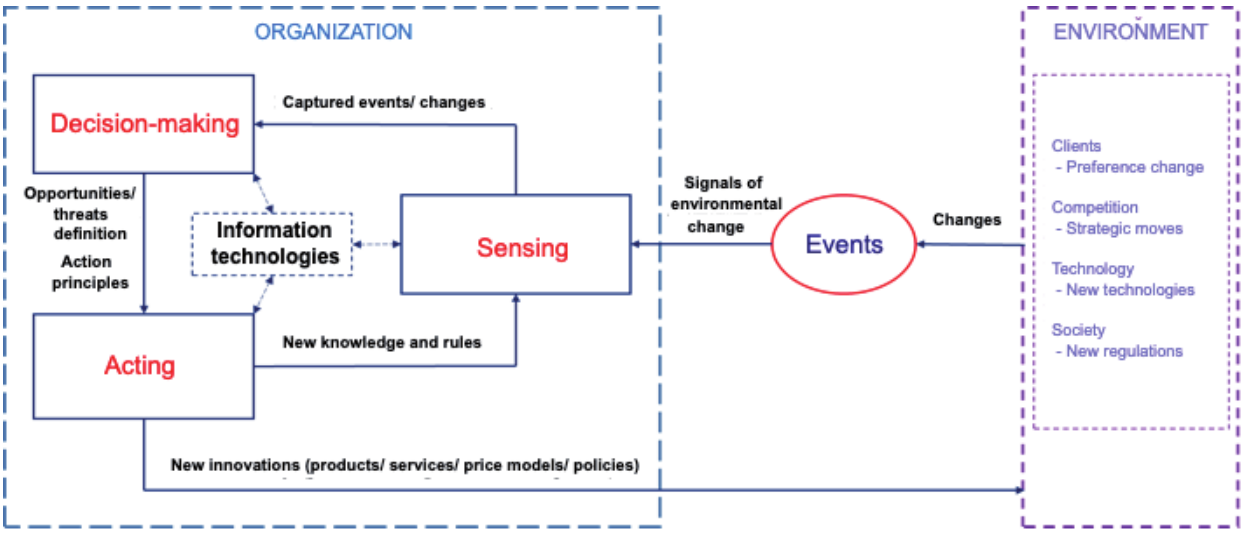

Source: *Park, Sawy, & Fiss, (2017)*

From an organizational perspective, the framework illustrates how organizations both reactively and proactively sense and respond to environmental changes, particularly those manifested in strategically significant business events. It also highlights the critical role of IT systems in supporting the three strategic tasks of sensing, decision-making, and action. The sophisticated relationship between environmental factors, organizational structures, and information technologies within this process loop suggests that organizational agility cannot be explained by any single element but rather by the configuration of these interrelated components (Thite, 2022; Sayed, 2023). By adopting this process-driven approach, we not only conceptualize agility but also provide a structured explanation of how various theoretically relevant elements combine to enhance organizational responsiveness. In this context, organizational agility is understood as a manifestation of dynamic capability, operationalized through strategic event management tasks at a process level (Park, 2017; Muto, et al., 2024).

Businesses today operate in a highly competitive, knowledge-driven economy, making Business Intelligence (BI) tools essential for gathering, analyzing, and disseminating information. These tools empower knowledge workers to make informed and strategic decisions. In a fast-paced global economy, it is critical for managers to access "actionable data"—information that can be used to track performance metrics, understand customer behaviour, and predict market trends in real-time. BI applications support a wide range of functions, including financial analysis, score-carding, data mining, data warehousing, and decision support, enabling organizations to stay agile and competitive (Gupta, 2024; Elsbach, & Stigliani, 2018). In order to promote innovation, HR and senior management should foster an environment that motivates employees and promotes voice behaviour. HRM can create multiple methods of engagement, acknowledging the diversity of the workforce profile and its specific needs (Azevedo, et al., 2021; Basit et al., 2024). HRM has an important role within an innovation strategy; as it can, together with other areas, create, develop and maintain actions that support and recognize innovative ideas and encourage employees to become actively engaged with the inclusion of innovation in their daily work life. Specifically, innovation exercises are an activity with much potential to foster voice and promote engagement towards innovation (Azevedo et al., 2021; Heilig, 2023; Prud'homme van Reine, 2017). The Organizational Sense-Response Process Loop

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is a framework that enables organizations to adapt to changing environments by continuously sensing external and internal changes, interpreting them, and responding effectively. This iterative process fosters agility, resilience, and competitiveness in dynamic markets (Ruijer et al., 2023; Chatwani, 2019). By integrating the Organizational Sense-Response Process Loop with BI, AI, and Organizational Innovation, SMEs benefit from enhanced agility, cost efficiency, competitive advantage, customer-centricity, and resilience. Real-time data and AI-driven insights enable SMEs to respond quickly to market changes, customer demands, and competitive pressures. Automation and data-driven decision-making reduce operational costs and minimize inefficiencies. The adoption of innovative technologies differentiates SMEs from competitors and opens new opportunities. AI and BI facilitate a deep understanding of customer needs, leading to better products, services, and experiences. Lastly, the iterative nature of the loop ensures SMEs can adapt to disruptions and maintain performance in volatile environments (Chatwani, 2019; Park et al., 2020).

In What Ways Does Human Resource Management (HRM) Support Organizational Innovation, Design Thinking, Artificial Intelligence (AI), and Business Intelligence (BI) to Improve Performance?

Human Resource Management (HRM) plays a pivotal role in promoting Business Intelligence (BI), Artificial Intelligence (AI), Design Thinking, and Organizational Innovation to enhance organizational performance. By fostering a culture of continuous learning, collaboration, and adaptability, HRM ensures that these advanced tools and methodologies are effectively integrated into the organization's operations, driving efficiency, creativity, and competitiveness. One of the primary ways HRM promotes Business Intelligence (BI) is by equipping employees with the skills and tools needed to collect, analyze, and interpret data. HRM facilitates training programs and workshops to enhance data literacy across the organization, ensuring that employees at all levels can leverage BI tools to make data-driven decisions (Gad-Elrab, 2021; Elsbach, & Stigliani, 2018; Prud'homme van Reine, 2017). Additionally, HRM plays a key role in implementing BI systems by aligning them with organizational goals and ensuring that data is accessible and actionable. By fostering a data-centric culture, HRM enables managers to track performance metrics, identify trends, and optimize processes, ultimately improving organizational efficiency and decision-making (Iyelolu et al., 2024; Curley, & Salmelin, 2018).

HRM also drives the adoption of Artificial Intelligence (AI) by identifying areas where AI can add value and ensuring that employees are prepared to work alongside AI technologies. This involves upskilling the workforce to handle AI-driven tools, such as predictive analytics, chatbots, and automation platforms (Hassani, & Blais, 2024). HRM also addresses potential resistance to AI by communicating its benefits and providing support during the transition. By integrating AI into recruitment, performance management, and employee engagement, HRM enhances productivity and reduces operational costs. For example, AI-powered recruitment tools can streamline hiring processes, while AI-driven performance analytics can provide personalized feedback and development plans for employees (Steltzer, 2024; Menon et al., 2023).

In promoting Design Thinking, HRM fosters a culture of creativity and user-centric problem-solving. HRM encourages cross-functional collaboration and empowers employees to think innovatively by organizing design thinking workshops and innovation labs. By embedding design thinking principles into the organizational culture, HRM ensures that employees focus on understanding customer needs, prototyping solutions, and iterating based on feedback. This approach not only enhances product and service development but also improves internal processes,

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as employees are encouraged to challenge the status quo and propose innovative solutions (Islam et al., 2022; Anjaningrum, Azizah, 2024; Lee, Ostwald, & Gu, 2020).

Moreover, Human Resource Management is instrumental in driving Organizational Innovation by creating an environment that encourages experimentation and risk-taking. HRM policies, such as flexible work arrangements, recognition programs, and innovation incentives, motivate employees to contribute ideas and take ownership of innovative projects. HRM also plays a critical role in building diverse and inclusive teams, which are essential for fostering creativity and generating fresh perspectives. By aligning innovation initiatives with strategic goals, HRM ensures that innovative efforts translate into tangible outcomes, such as new products, improved services, or streamlined operations. HRM acts as a catalyst for integrating BI, AI, Design Thinking, and Organizational Innovation into the fabric of the organization. By investing in employee development, fostering a collaborative and innovative culture, and aligning these initiatives with organizational objectives, HRM enhances the organization's ability to adapt to changing market dynamics, improve decision-making, and deliver value to customers (Rondi, De Massis, & Kotlar, 2019). This holistic approach not only boosts performance but also positions the organization as a forward-thinking and competitive player in its industry. Through its strategic role, HRM ensures that the organization remains agile, resilient, and future-ready in an increasingly complex and fast-paced business environment (Roux, 2023).

CONCLUSION

Through the prism of evolving technologies and methodologies, this review has examined the relationship between strategy, innovation, and entrepreneurship, with a focus on Kenyan SMEs. The innovation ecosystem, which emphasises interconnectedness among participants and was adapted from business ecosystems, is at the centre of this discussion. Deeper empirical research is necessary; as present scholarship shows a gap in our understanding of the internal architecture of such ecosystems. With its systematic, compassionate, and multidisciplinary approach to problem-solving, Design Thinking (DT) is emerging as a vital innovation paradigm that is particularly pertinent in industries such as healthcare.

It makes it possible to create scalable and flexible human-centred solutions when combined with artificial intelligence (AI). By automating repetitive processes, gaining insights from unstructured data, and resolving difficult issues at scale, artificial intelligence (AI) in turn offers disruptive possibilities. The Human-Centered AI (HCAI) paradigm reinterprets how technology contributes to innovation. It supports structures that foster creativity, increase human agency, and incorporate moral values like social justice, responsibility, and privacy. By emphasising AI as a tool for empowerment rather than replacement, this move from algorithm-centric to human-centric design highlights the importance of ethical innovation. This ecosystem is further improved by business intelligence (BI), which makes data-driven decision-making possible. By using predictive modelling and advanced analytics, BI systems assist businesses in extracting useful information from large datasets, which enhances decision-making. This ecosystem is further improved by business intelligence (BI), which makes data-driven decision-making possible. BI solutions improve operational efficiency and strategic foresight by assisting organisations in extracting meaningful insights from large datasets through advanced analytics and predictive modelling. Intelligent, flexible, and sustainable innovation is based on the synergy between BI, AI, and DT. Due to their substantial contributions to GDP, employment, and innovation, SMEs in Kenya are essential to the country's development. Despite this, they have a high failure rate because of financial and structural issues. A workable plan for overcoming these obstacles is offered by the integration of AI, BI, and

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DT, as conceptualised by the SME Digital Innovation Cycle (SDIC) and the Triple-Layer Innovation Framework. SMEs can prosper in a rapidly shifting economic environment because of these models, which place an emphasis on cyclical learning, iterative problem-solving, and dynamic adaptation. In the end, encouraging innovation in SMEs through astute, data-driven, and human-centred methods not only improves business sustainability but also advances national priorities like the Sustainable Development Goal 8 of the UN and Kenya's Bottom-Up Economic Transformation Agenda (BETA). The combination of human-centred design with technical potential has the ability to generate durable economic transformation and equitable growth.

Author's Comment:

- Generative AI was used to refine and improve the clarity, quality, and coherence of this document.
- Any significant gaps or issues will be addressed in future research

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