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How Mobile Applications can improve Small Business Development

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ABSTRACT

The advent of digital technology, especially through Artificial Intelligence (AI) and mobile applications, is fundamentally transforming business strategies in the contemporary landscape. This paper introduces the Mobile App and Artificial Intelligence Business Innovation Cycle (MABIC), a novel framework that builds upon and surpasses the foundational principles of the Net-Enabled Business Innovation Cycle (NEBIC) and the App-enabled Business Innovation Cycle (ABIC). Designed to leverage the synergistic potential of AI and mobile apps, MABIC addresses the unique challenges and opportunities presented in the post-pandemic business environment. It guides businesses in identifying emerging technologies, aligning them with market opportunities, executing innovative strategies, and assessing their impact on customer value and business performance. This paper delineates the components of the MABIC model, compares it with its predecessors, and discusses its practical implications. By integrating AI and mobile technology into strategic business operations, MABIC offers a comprehensive approach for businesses to innovate, adapt, and thrive in an era marked by rapid technological advancements and shifting consumer expectations.

I. INTRODUCTION

The landscape of contemporary business strategies is increasingly being reshaped by the pivotal role of digital technologies, particularly through the integration of mobile apps and Artificial Intelligence (AI) (Criado & Gil-Garcia, 2019). This transformation is propelled by the widespread adoption of smartphones, significant advancements in AI capabilities, and a shift in consumer behaviors, notably accelerated by the global COVID-19 pandemic (Rakshit et al., 2021). Mobile apps have emerged as essential tools for enhancing customer engagement and experience, offering businesses a direct and personalized channel to their audience (Nayati Utami et al., 2019; Owoseni, 2018). They streamline operational efficiencies, break down geographical barriers for market expansion, and serve as platforms for innovation and product development. Concurrently, AI is revolutionizing business strategies by enabling data-driven decision-making, automating routine tasks to boost efficiency, and allowing for personalization at an unprecedented scale. Its predictive analytic capabilities provide businesses with the foresight needed to navigate market dynamics proactively. The synergy between mobile apps and AI is setting a new benchmark for innovation in business strategies. AI-enhanced mobile apps are offering more personalized, intuitive, and engaging user experiences, ranging from personalized recommendations to voice-activated services and augmented reality. This integration not only facilitates real-time data collection and analysis, enabling businesses to swiftly adapt to changes and consumer feedback but also underscores the necessity of adopting these technologies for competitive differentiation and growth. As digital technologies continue to evolve, their integration into business strategies becomes

indispensable for companies aiming to thrive in the digital marketplace (Chammassian & Sabatier, 2020; Feng et al., 2019; Ilavarasan & Ei Chew, 2016). The future of business is unequivocally digital, with mobile apps and AI at the forefront of driving strategic innovation, operational excellence, and customer satisfaction in the contemporary business ecosystem (Bresnahan et al., 2014).

NEBIC, established in the early 2000s, marked a significant shift in business strategy by emphasizing the use of digital networks for innovation. It introduced a cycle that starts with selecting emerging technologies, then matching these to economic opportunities, executing innovations for growth, and evaluating the generated customer value. This approach suggested that technology selection should lead, not just align with, corporate strategy, highlighting the strategic importance of technology in business evolution and the need for dynamic capabilities to adapt to changing environments (Wheeler, 2002). Building on NEBIC, ABIC specifically focused on the transformative potential of mobile applications. It outlined how mobile apps could create business value by navigating the mobile tech ecosystem, spotting and aligning with opportunities, implementing innovations, and measuring outcomes. ABIC underscored the power of mobile platforms in strategic business positioning and stressed the necessity of ongoing learning and adaptability in the fast-paced digital landscape (Ehrenhard et al., 2017). Beyond NEBIC and ABIC, other models have also contributed to the evolving landscape of digital business strategies. Dynamic Capabilities Framework emphasizes the organization's ability to adapt, integrate, and reconfigure internal and external competencies to address rapidly changing environments. Similarly, the Resource-Based View (RBV) of the firm offers insights into how unique resources and capabilities can be leveraged for competitive advantage, albeit with a focus on more stable environments (Cavallari & Moro Visconti, 2016; Cele & Van Belle, 2023; Ford, 2012).

Each of these models has contributed to a deeper understanding of how digital technologies can be systematically exploited to create new value propositions, transform business operations, and sustain competitive advantage. They underscore the shift from traditional, linear business models to more agile, technology-driven strategies that can quickly adapt to market changes and technological advancements. As digital technologies continue to evolve, frameworks like NEBIC and ABIC serve as foundational guides, illustrating the critical role of innovation, adaptation, and strategic foresight in the digital era. These models not only illuminate the path for leveraging emerging technologies but also stress the importance of viewing technology as a strategic asset integral to business development and success in the contemporary digital landscape.

While NEBIC and ABIC have laid a strong foundation for understanding digital technology's role in business innovation, particularly through digital networks and mobile applications, they do not fully address the rapid advancements in artificial intelligence (AI) and the significant shifts in the business landscape triggered by the COVID-19 pandemic. These two factors have introduced unprecedented challenges

and opportunities for businesses, necessitating an evolution in existing models to incorporate these emerging dynamics (Lv et al., 2023).

AI technology has become a pivotal element in shaping business strategies, offering capabilities that extend beyond traditional IT frameworks. AI's ability to analyze large datasets, automate complex processes, personalize customer experiences, and drive decision-making processes presents new avenues for creating competitive advantages. However, existing models like NEBIC and ABIC, while adaptable, do not explicitly account for the strategic integration and implications of AI technologies within the cycle of business innovation. This gap underscores the need for an updated or new framework that considers AI not just as a tool but as a core component of strategic business innovation, capable of continuously redefining market opportunities, operational efficiencies, and customer value propositions (Dias et al., 2023). Similarly, the COVID-19 pandemic has dramatically altered the business environment, accelerating the shift towards digital operations, remote work, and online consumer engagement (Rakshit et al., 2021).

To bridge these gaps, future models need to incorporate AI's strategic role and the lessons learned from the pandemic's impact on digital transformation. This includes a greater emphasis on digital agility, resilience, and the ability to quickly seize new business opportunities in a constantly evolving environment. Such models would benefit from a holistic view that integrates technology, market dynamics, and consumer behavior, ensuring businesses can navigate and thrive in the digital age's complexities and uncertainties.

In this paper, we have introduced the Mobile App and Artificial Intelligence Business Innovation Cycle (MABIC), a pioneering framework aimed at encapsulating the essence of business innovation in the digital age, particularly aiming the rapid integration of AI in every sphere of life and in the aftermath of the COVID-19 pandemic. MABIC stands on the shoulders of its precursors, the Net-Enabled Business Innovation Cycle (NEBIC) and the App-enabled Business Innovation Cycle (ABIC), by integrating the advanced capabilities of artificial intelligence (AI) and mobile applications into a comprehensive model for digital business strategy. This integration is pivotal, considering the rapid technological advancements and the shift in business paradigms prompted by recent global challenges. MABIC is designed to guide businesses through the complexities of today's digital landscape, leveraging AI for enhanced data-driven decision-making and mobile apps for improved customer engagement and service delivery. Through this model, we aim to provide a strategic framework that not only addresses the immediate challenges businesses face in the post-pandemic world but also equips them with the tools to innovate, adapt, and thrive in the evolving digital ecosystem.

II Related Works

Review of NEBIC and ABIC: Analyze the components and effectiveness of these models in fostering business innovation through digital networks and mobile apps. Impact of AI on Business: Discuss how AI technologies are reshaping business processes, customer interactions, and competitive landscapes. Business Transformation During and After COVID-19: Examine how the pandemic has accelerated digital transformation, with a focus on mobile app adoption and AI integration.

A Net-Enabled Business Innovation Cycle

The Net-Enabled Business Innovation Cycle (NEBIC) model, developed in the early 2000s, presents a theoretical framework for understanding how firms can create customer value through the business use of digital networks (Wheeler, 2002) is shown in Fig. 1. NEBIC posits a cycle composed of four sequential stages: Choosing Emerging/Enabling Information Technologies (ET), Matching these technologies with Economic Opportunities (EO), Executing Business Innovation for Growth (BI), and Assessing Customer Value (CV). This cycle is underpinned by the dynamic capabilities theory, which emphasizes a firm's ability to adapt, integrate, and reconfigure internal and external competencies to quickly respond to changing environments. The model starts with the identification and selection of emerging

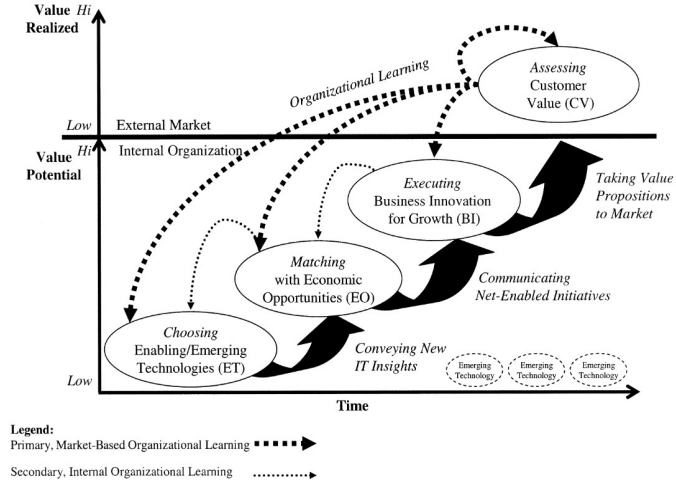

Fig. 1 Net-Enabled Business Innovation Cycle (Wheeler, 2002)

or enabling technologies, suggesting that this choice should precede and inform corporate strategy rather than align with it post-factum. Following this, firms must match these technologies with viable economic opportunities, leveraging them to drive business innovation and growth. The execution stage involves the practical application of chosen technologies to realize the identified opportunities, requiring organizational reconfiguration and resource alignment. Finally, the cycle concludes with assessing the created customer value, utilizing financial, perceptual, and behavioral measures to gauge the impact of the innovation. NEBIC integrates both

variance and process theory perspectives, offering a comprehensive view that not only predicts the outcome of net-enabled business innovation but also explains the processes that lead to these outcomes. It underscores the importance of effective communication and organizational learning processes across all stages, facilitating the continuous flow of insights and improvement of capabilities. The model serves as a roadmap for firms to systematically harness new technologies for competitive advantage, highlighting the critical role of proactive and strategic technology management in the digital era.

B App-enabled Business Innovation Cycle (ABIC)

The App-enabled Business Innovation Cycle (ABIC) builds upon the Net-Enabled Business Innovation Cycle (NEBIC) that is shown in Fig. 2, with a specific focus on leveraging mobile applications for business value creation. Unlike NEBIC's broad IT-centric approach, ABIC specifically emphasizes the strategic role of mobile apps in business ecosystems. The

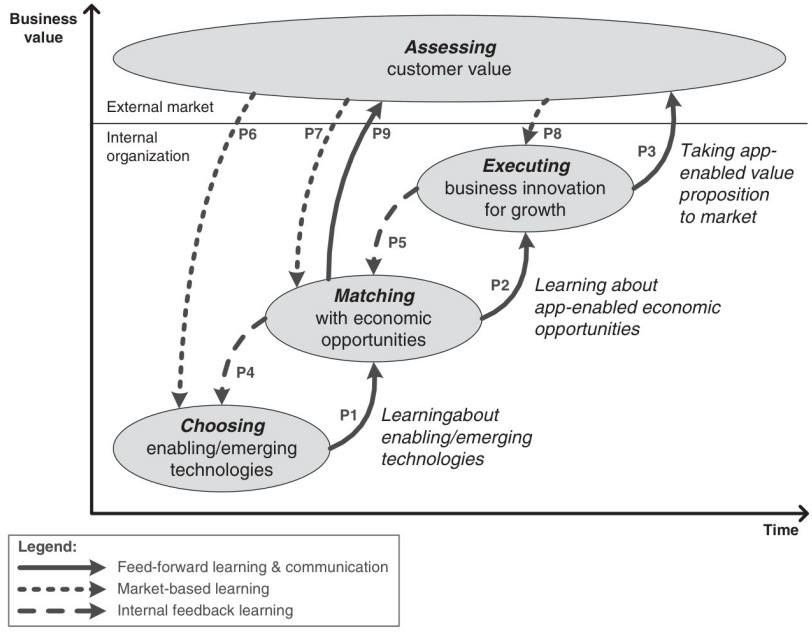

Fig. 2 APP-Enabled Business Innovation Cycle (Ehrenhard et al., 2017)

essence of ABIC is encapsulated in its nine research propositions, which outline the critical steps and learning processes necessary for app-enabled startups to achieve and sustain business value. These propositions underscore the importance of understanding emerging technologies, matching these technologies with business strategies, executing business innovations effectively, and continuously assessing the value delivered to customers. ABIC highlights the app not just as technology but as a strategic business tool, emphasizing the need for continuous adaptation and learning in the rapidly evolving digital marketplace.

1. Effective learning processes that create or change understanding are necessary between the choosing and matching capabilities to create business value.
2. Effective learning processes that clarify priorities and objectives are necessary between the matching and executing capabilities to create business value.
3. Effective communication and delivery processes are necessary from the executing capability to the marketplace to create business value.
4. The choosing capability is strengthened when learning conveys insights from the matching capability.
5. The matching capability is strengthened when learning conveys insights from the executing capability.
6. The choosing capability is strengthened when learning is based on marketplace data.
7. The matching capability is strengthened when learning is based on marketplace data.
8. The executing capability is strengthened when learning is based on marketplace data.
9. Effective communication processes are necessary from the matching capability to the marketplace to create business value.

III Theoretical Framework

A Defining MABIC

The Mobile App and Artificial Intelligence Business Innovation Cycle (MABIC) represents a forward-thinking framework specifically designed to harness the transformative power of artificial intelligence (AI) and mobile applications in the contemporary business environment. This model emerges as an evolution of the Net-Enabled Business Innovation Cycle (NEBIC) and the App-enabled Business Innovation Cycle (ABIC), integrating the latest technological advancements to address the unique challenges and opportunities presented in the post-pandemic world. MABIC aims to guide organizations in strategically leveraging AI and mobile technologies to create unparalleled customer value, achieve market differentiation, and foster sustainable growth in an era marked by rapid digital transformation. This process is depicted in Fig. 3.

B Components of MABIC

a Choosing Emerging AI and Mobile Technologies

The first component of the MABIC framework emphasizes the critical process of identifying and selecting emerging AI and mobile technologies that promise to provide a competitive advantage and drive resilience in the market. This stage involves a comprehensive analysis of the technological landscape to pinpoint innovations that not only enhance operational

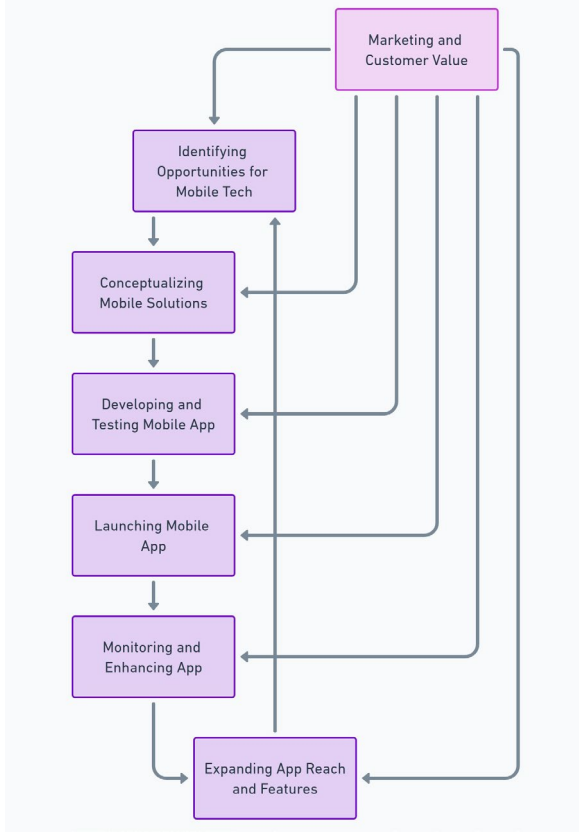

Fig. 3 Mobile App and Artificial Intelligence Business Innovation Cycle (MABIC)

efficiencies and customer engagement but also have the potential to revolutionize product offerings and business models. The selection process is guided by a forward-looking perspective, aiming to anticipate and meet future market demands and customer expectations.

b Matching Opportunities with AI and Mobile Innovations

Once promising technologies are identified, the MABIC model focuses on aligning these innovations with current and emerging market opportunities. This phase is particularly attuned to the shifts in consumer behavior and market needs precipitated by the COVID-19 pandemic. It involves a strategic assessment of how AI and mobile app technologies can meet these new demands, address pain points, and capitalize on untapped opportunities. The goal is to ensure that technological initiatives are not only technologically feasible but also commercially viable and strategically aligned with market dynamics.

c Executing AI-Driven and Mobile-App-Based Innovations

With a clear understanding of the technological capabilities and identified market opportunities, the next step in the MABIC cycle is the execution of these AI-driven and mobile-appbased innovations. This component encompasses the development, deployment, and scaling of technology solutions, ensuring they are effectively

integrated into the organizationâA˘ Zs´ operations and offerings. Execution requires a cross-functional approach, involving collaboration across departments to ensure that the technological innovations are implemented seamlessly, meet quality standards, and deliver on the promised value. The relationship between customer value, marketing, and the growth of small businesses or apps presents a complex but insightful landscape across various examples which is shown in Fig. 4

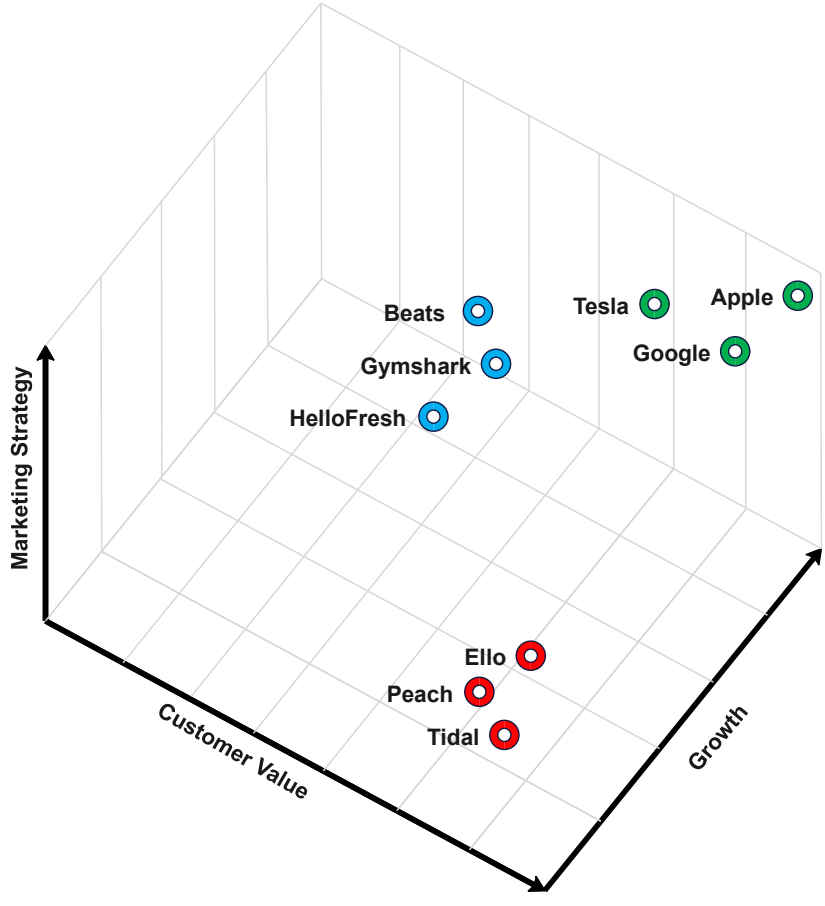

Fig. 4 Impact of marketing on the business growth

1. High Customer Value with Effective Marketing Leading to Growth: Applications like *Duolingo*, *Etsy*, and *Canva* showcase how combining high customer value with effective marketing strategies can lead to remarkable growth. These entities utilized innovative approaches such as social media engagement, community building, and freemium models to expand their user base and achieve significant market success.
2. Moderate Customer Value with Marketing-Driven Growth: Companies like *Gymshark*, *Warby Parker*, and *HelloFresh* illustrate that even with moderate customer value, focused marketing efforts can drive substantial business growth. These businesses capitalized on strategies such as influencer

marketing, unique selling propositions, and aggressive promotional campaigns to stand out in competitive markets.

3. High Customer Value Hindered by Insufficient Marketing: Examples such as *Tidal*, *Peach*, and *Ello* demonstrate that despite offering high customer value, inadequate marketing can severely impede growth. These platforms, despite their unique features and emphasis on quality and privacy, were unable to adequately market their value propositions to a wider audience, thereby limiting their growth and market penetration.

d Assessing Value in the New Normal

The final stage of the MABIC framework involves a critical assessment of the value generated by the implemented innovations in the context of the new normal shaped by the pandemic and ongoing digital evolution. This phase evaluates the impact of AI and mobile app innovations on customer satisfaction, market positioning, and overall business performance. The assessment provides insights into the effectiveness of the innovations, highlighting areas of success and identifying opportunities for further refinement and improvement.

C Integration of Marketing and Customer Value

The MABIC model incorporates a pivotal element focusing on the synergistic integration of marketing strategies and customer value creation. This integration is fundamental to ensuring that technological innovations, particularly those driven by AI and mobile applications, are not only developed but also effectively communicated and delivered to the market. This component emphasizes the necessity of aligning marketing efforts with the intrinsic value offered by the innovations to foster growth, user engagement, and sustainable competitive advantage.

a Strategic Marketing in the Digital Era

The digital era demands a reevaluation of traditional marketing strategies, advocating for approaches that leverage digital platforms, social media, and data analytics. In the context of MABIC, strategic marketing involves the use of targeted online campaigns, influencer partnerships, content marketing, and search engine optimization to enhance visibility and attract a broader audience. The goal is to create a compelling narrative around the AI and mobile app innovations that resonate with the target market's needs and preferences.

b Creating Superior Customer Value

At the heart of the MABIC model lies the commitment to delivering superior customer value through technological innovations. This entails not just the functional benefits of the technology but also the emotional and experiential value it provides to users. For AI and mobile app-based solutions, this could mean personalized user experiences, enhanced convenience, improved accessibility, or unique functionalities that address specific pain points. The focus is on understanding and anticipating customer needs, thereby developing solutions that not only meet but exceed expectations.

c Synchronizing Innovation with Market Needs

A critical aspect of integrating marketing and customer value within the MABIC framework is the continuous alignment of technological innovations with evolving market needs. This involves ongoing market research, customer feedback loops, and competitive analysis to ensure that the AI and mobile app solutions remain relevant and desirable. Marketing strategies are then tailored to highlight these alignments, showcasing how the innovations address current challenges or opportunities in the market.

d Evaluating Marketing Effectiveness and Value Creation

The integration of marketing and customer value culminates in the systematic evaluation of marketing effectiveness and the extent of value creation. Metrics such as customer acquisition cost, customer lifetime value, market share growth, user engagement rates, and return on marketing investment offer insights into the success of the marketing strategies employed. Furthermore, customer satisfaction surveys, net promoter scores, and user feedback provide qualitative measures of the value perceived by the customers.

This holistic approach ensures that marketing strategies and customer value creation are not siloed activities but are interwoven throughout the technological innovation process. By doing so, the MABIC model facilitates not just the development of cutting-edge AI and mobile app innovations but also their successful market adoption and the realization of business growth objectives.

IV MABIC Model Development

The MABIC model, an innovative framework designed to leverage Artificial Intelligence (AI) and mobile applications, offers a strategic blueprint for businesses aiming to navigate the complexities of the post-pandemic market landscape. The development process is shown in Fig. 5. This model not only emphasizes the importance of adopting cutting-edge technologies but also underlines the role of marketing in delivering exceptional customer value. As businesses strive to differentiate themselves and secure a competitive advantage, the integration of AI and mobile technologies becomes crucial in enhancing operational efficiencies and enriching customer experiences. The development and operationalization of the MABIC model involve a series of methodical steps, starting with the identification and selection of emerging AI and mobile technologies. These technologies should not only offer operational benefits but also enhance the customer experience, thereby providing a solid foundation for competitive differentiation. The next step, matching opportunities with AI and mobile innovations, requires businesses to align their technology choices with market opportunities, especially those that have emerged or expanded due to the pandemic. This alignment ensures that the technological solutions deployed are directly addressing current market needs and customer expectations. Executing AI-driven and mobile-app-based innovations is where the strategic plans are put into action. This phase involves the actual deployment of

selected technologies to capitalize on identified market opportunities. The focus here is not just on launching new products or services but also on ensuring that these innovations are effectively marketed to reach and resonate with the target audience. The final component, assessing value in the new normal, involves a thorough evaluation of the impact these innovations have on customer value and business performance. This assessment helps in understanding the effectiveness of the implemented solutions and guides future strategic decisions.

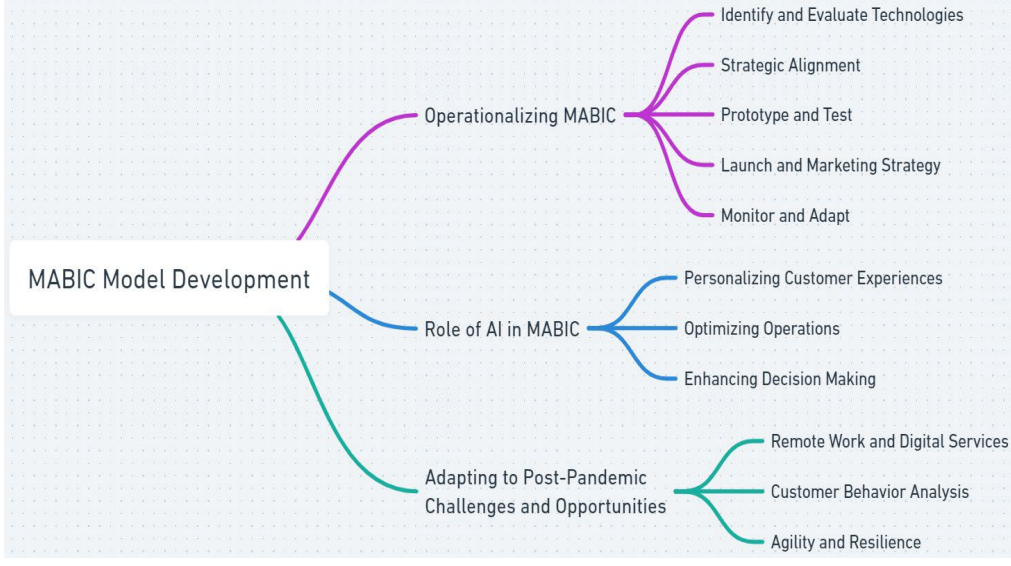

Fig. 5 MABIC model development stages

Incorporating AI into the MABIC model enhances decision-making, operational efficiency, and customer engagement across all components. AI technologies can analyze vast amounts of data to identify trends and insights, automate routine tasks to improve efficiency, and personalize customer interactions to boost engagement and satisfaction. Furthermore, adapting to post-pandemic challenges and opportunities is a critical aspect of the MABIC model. Leveraging mobile apps and AI allows businesses to remain agile, responsive, and innovative in a rapidly changing environment. Whether it's through offering contactless services, enhancing online presence, or utilizing AI for better customer insights, the MABIC model provides a comprehensive approach to achieving growth and resilience in the post-pandemic era.

V Discussion

The MABIC model represents a significant evolution from its predecessors, NEBIC and ABIC, by integrating the latest technological advancements and market insights to address the challenges and opportunities of the contemporary business landscape. This comparative analysis highlights the enhancements and critical adaptations that distinguish MABIC, making it a more suitable framework for today's rapidly changing environment.

A Comparative Analysis

MABIC extends the foundational principles of NEBIC and ABIC by integrating Artificial Intelligence (AI) and mobile technologies as central to business innovation strategies. Unlike its predecessors, MABIC offers a more holistic approach towards leveraging digital advancements:

- NEBIC, which emerged in the early 2000s, was pivotal in emphasizing the strategic use of net-enabled technologies for business innovation. It focused on selecting new IT, matching technology with economic opportunities, executing business innovations, and assessing customer value. NEBIC was instrumental in highlighting the role of the internet and digital networks in transforming business models.
- ABIC refined this concept by specifically addressing the burgeoning impact of mobile applications on business value creation. It centered around the utilization of apps to enhance customer engagement, streamline operations, and open new marketing channels. ABIC acknowledged the shift towards mobile computing and its significance in consumer interaction.
- MABIC, building upon these models, introduces AI as a transformative force alongside mobile apps. It recognizes the exponential capabilities of AI in analyzing data, automating processes, and personalizing customer interactions. MABIC not only aims for presence across mobile platforms but seeks to harness AI and mobile apps in unison to foster innovation, optimize customer value, and ensure resilience in the face of evolving market dynamics. This model is particularly attuned to the complexities of the post-pandemic business landscape, emphasizing agility, predictive insights, and enhanced customer experiences through AI-driven solutions.

MABIC's integration of AI into the cycle of innovation significantly augments its framework by providing businesses with the tools to not only adapt to rapid changes in consumer behavior and market conditions but also to anticipate future trends. The synergy between AI and mobile technologies under the MABIC model offers a comprehensive pathway for businesses to navigate the intricacies of today's digital economy, marking a significant evolution from NEBIC and ABIC's initial focus areas.

B Implications for Practice

The MABIC framework represents a strategic tool for businesses aiming to fully leverage the capabilities of AI and mobile applications within their operational and strategic frameworks. It guides the incorporation of cutting-edge technologies into business models in a manner that is aligned with strategic goals and responsive to market needs. For practical implementation, businesses are encouraged to start by pinpointing emerging AI and mobile technologies that not only promise to enhance operational efficiency and customer experience but also dovetail with broader strategic objectives. The critical next step involves matching these technological solutions with concrete market opportunities, thereby ensuring that innovation efforts are squarely aimed at areas with the highest potential for impact. MABIC's emphasis

on the iterative assessment of technology-driven initiatives on customer value and overall business performance serves as a cornerstone for continuous improvement. This approach not only facilitates targeted innovation that meets current customer needs but also ensures that businesses remain adaptable and competitive in a dynamic market environment, thereby securing a sustainable competitive advantage.

VI Conclusion

This paper introduced the MABIC model, a forward-looking framework designed to harness the synergies of Artificial Intelligence (AI) and mobile applications in the realm of business innovation. MABIC stands out by not only acknowledging but actively integrating the transformative potential of AI and mobile technologies, presenting a comprehensive approach to navigating the post-pandemic business landscape. Through its componentsâA˘TChoosing˘ Emerging AI and Mobile Technologies, Matching Opportunities with AI and Mobile Innovations, Executing AI-Driven and Mobile-App-Based Innovations, and Assessing Value in the New NormalâA˘TMABIC offers a strategic pathway for businesses to adapt, innovate,˘ and thrive in an era marked by rapid technological advancements and shifting consumer expectations.

A Future Research Directions

While MABIC provides a robust framework for integrating AI and mobile apps into business strategies, it opens avenues for further research to refine and expand its applicability. Future studies could explore longitudinal implementations of MABIC across various industries to validate its effectiveness and adaptability. Additionally, research could delve into the integration of emerging technologies beyond AI and mobile apps, such as blockchain and the Internet of Things (IoT), to further enhance the MABIC model's comprehensive nature.

B Limitations

One limitation of the MABIC model lies in its reliance on the readiness of businesses to adopt and effectively implement AI and mobile technologies. Organizations lacking in digital literacy or technological infrastructure may find the model challenging to apply, underscoring the need for foundational investments in digital capabilities and culture as prerequisites for leveraging MABIC successfully.

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