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Development Problems and New Paths of Small and Medium-Sized Enterprises under the Background of Digital Economy

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Abstract: This research explores the transformative impact of the digital economy on small and medium-sized enterprises (SMEs) within the global landscape. In response to the digitalization of the economy, SMEs face both opportunities and challenges that significantly shape their development. The study delves into the positive impact of the digital economy on SMEs, emphasizing the role of internet-based technologies in expanding market access, breaking down trade barriers, and restructuring supply chains. However, it also highlights cybersecurity challenges that SMEs encounter, particularly in the context of increased digitalization and the COVID-19 pandemic. The article further investigates how the digital economy fosters innovation for SMEs, enabling them to contribute significantly to radical advancements and non-technological innovation. The research underscores the symbiotic relationship between digital technologies and SMEs' innovative capabilities, emphasizing their role as catalysts for economic growth. Additionally, the study explores how the digital economy helps SMEs optimize their cost structures, achieve revenue growth, and gain access to new markets through digitalization. The article provides a comprehensive analysis of the multifaceted relationship between SMEs and the digital economy, drawing perspectives from market dynamics, cybersecurity challenges, innovation landscapes, and financial optimization. The findings contribute valuable insights for policymakers, business leaders, and stakeholders, advocating for enhanced cybersecurity measures, digital technology adoption, and strategic innovation to foster a resilient and thriving ecosystem for SMEs in the digital age. The article concludes with recommendations for bridging the digital divide, enhancing cybersecurity measures, and promoting digital transformation among SMEs in an adaptive manner.

Keywords: Digital economy, Small and medium-sized enterprises, technology

1. Introduction

1.1. Research Background

As the global economy becomes more digitalized, small, and medium-sized enterprises (to be called SMEs for convenience), an integral part of economy, face unique challenges and opportunities in adapting to the digital landscape. Although digital technologies such as telemedicine, e-commerce,

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and e-learning have sufficient impact on our life, there is relatively little attention toward the effect and impact of digital economy on SMEs development. This research aims to investigate the profound impact of the digital economy on SMEs, exploring how changes and new technology in the digital world influence their operations, market presence, and overall sustainability. Understanding these dynamics is crucial for policymakers, business leaders, and stakeholders alike, as it contributes to informed decision-making in fostering a resilient and thriving ecosystem for small and medium-sized enterprises in the digital age. This research's significance extends beyond academic curiosity; it holds practical implications for the formulation of informed policies, strategic business decisions, and collaborative efforts among stakeholders. The aim is not just to decode the impact but to empower policymakers, business leaders, and stakeholders with a profound understanding of the digital forces shaping SMEs. In doing so, the research contributes to the collective endeavor of fostering a resilient, adaptive, and thriving ecosystem that can support and elevate small and medium-sized enterprises in the ever-evolving landscape of the digital age.

1.2. Literature Review

There are already a few articles analyzing the impact of digital economy on SMEs development. In recent years, scholars have attempted their focus into this problem, utilizing administrative universal firm registration data and surveys of small business owners in China, investigates the impact of digitization on small and medium enterprises (SMEs) during the pandemic [1]. The findings reveal that digitization enhances SMEs' resilience by mitigating demand decline, sustaining cash flow, enabling quick reopening, and fostering growth outlooks. Following the lockdown, firm entries, particularly in e-commerce, exhibit a V-shaped pattern, indicating a faster rebound. The pandemic has accelerated digital technology adoption among existing firms, evidenced by changes in operation scope, remote work facilitation, and the adoption of electronic information systems, with these effects persisting even a year after full reopening.

2. Digital Economy Help Enlarge Market Access for SMEs

2.1. The Positive Impact of Digital Economy on SMEs

The digital economy acts as a transformative force, propelling Small and Medium Enterprises (SMEs) into a realm of expanded market access. By harnessing internet-based technologies like artificial intelligence (AI), the Internet of Things (IoT), and blockchain, SMEs find entry points into Global Value Chains (GVCs) and international trade opportunities, as highlighted by the World Trade Organization (WTO) in 2018. The services sector experiences particular benefits, with digital technologies diminishing trade barriers and reducing costs for all firms, especially in services [2,3]. Notably, internet access emerges as a pivotal factor in breaking down trade barriers, empowering SMEs to reach foreign markets through online sales and e-commerce channels. The proliferation of smartphones facilitates technology leapfrogging, providing a strategic advantage to firms in developing countries and creating novel trade opportunities, as underscored by the International Trade Centre (ITC) in 2015. The digital economy not only influences SMEs' market access but also contributes to the restructuring of their supply chains. Services such as programming and logistics, demanding only essential technical skills, become feasible offerings in the digital landscape, leading to the emergence of new business models, as highlighted by ITC in 2015 [4]. Online sales, emphasizing smaller "just-in-time" purchases, become increasingly prevalent, potentially benefiting SMEs, as indicated by AliResearch in 2017 [5]. However, capitalizing on these opportunities demands SMEs' commitment to adopting digital technologies and allocating necessary resources.

Despite these advantages, SMEs encounter persistent barriers to participating within the digital economy. Access to the internet becomes a prerequisite for GVC inclusion and multinational

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corporations prioritize assessing SMEs based on their Information and Communication Technology (ICT) operational level when entering business relationships [6,7]. Bridging the digital divide and enhancing ICT capabilities emerge as critical mechanisms for SMEs to fully leverage the digital economy's potential for expanded market access and global trade participation.

2.2. Cybersecurity Challenges in the Digital Economy

While the digital economy presents numerous advantages for SMEs, it is not without its challenges. Cybersecurity emerges as a critical concern, crucial for maintaining economic and financial stability on a global scale. A breach or hack of entities like Central Banks, Ministries of Finance, or major commercial banks incurs significant financial harm, affecting stakeholders ranging from national governments to small businesses and individuals. In a 2019 survey, 300 global CEOs identified the lack of cybersecurity as the single greatest threat to the global economy over the next decade. The impact of cyber-attacks on the global economy is substantial, with estimates indicating the cost of cybercrime could exceed $8 trillion in 2023, surpassing the national economies of all but two countries—the United States and China [8].

SMEs are particularly vulnerable to cyber-attacks, with companies having fewer than 100 employees being three times more likely to be targeted than larger enterprises. This threat is exacerbated in the context of the COVID-19 pandemic, where increased digitalization correlates with intensified cyber-attacks [9]. The intricate digital environment, marked by a shift of business operations online and increased use of mobile devices, creates new vulnerabilities that hackers can exploit. This complexity has deepened the divide between small and large firms. Larger firms, often equipped with dedicated digital security departments, can defend against these threats, while SMEs, as the digital business ecosystem becomes more interconnected, emerge as "weak links" in networks, offering hackers easier access points to target larger entities. The digital insecurity created by COVID-19 and these new complexities has exacerbated the vulnerability of SMEs, underscoring the need for enhanced cybersecurity measures to fortify these crucial players in the digital economy.

3. Digital Economy Help Foster Innovation for SMEs

The digital economy plays a pivotal role in reshaping the innovation landscape for Small and Medium Enterprises (SMEs), providing a dynamic framework that transcends traditional barriers. The synergy between digital technologies and SMEs' innovative capabilities arises from their agility to respond to niched market demands and evolving technologies. As we explore the multifaceted relationship between the digital economy and SME innovation, it becomes evident that the digital ecosystem empowers SMEs to overcome structural disadvantages, tapping into their comparative advantages. This symbiotic relationship not only propels SMEs to contribute significantly to radical innovations but also enables them to harness knowledge spillovers, network access, and collaborative opportunities both locally and globally [10].

3.1. Driving Radical Innovation

In the realm of innovation, SMEs, particularly new and small firms, emerge as catalysts for radical advancements that fuel economic growth. By operating outside established paradigms, they seize overlooked technological or commercial opportunities, bringing to fruition innovations that might have otherwise languished in the peripheries [11,12]. This section highlights how SMEs, though not uniformly innovative, contribute substantially to patent filings, with examples such as accounting for approximately 20% of patents in biotechnology-related fields in Europe [13]. The digital economy facilitates this by providing a conducive environment for SMEs to thrive in innovation ecosystems, fostering an atmosphere of creativity and adaptability.

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3.2. Non-Technological Innovation and Global Collaboration

Innovation among SMEs extends beyond technological realms, embracing non-technological dimensions within the knowledge-based economy. The rise of open and network-based modes of innovation, reshapes SMEs' roles in value creation [12]. This section explores how SMEs contribute to innovation by adopting and adapting external innovations through incremental changes. Furthermore, it delves into the transformative impact of global collaboration on SME innovation, elucidating how digitalization has increased the significance of cross-border partnerships, and further examines the challenges SMEs face in identifying and connecting with knowledge partners and networks at local, national, and global levels [14]. The digital economy serves as an enabler, providing SMEs with the tools and platforms to navigate these challenges and integrate external knowledge seamlessly into their innovation processes.

This comprehensive analysis delves into the intricate ways in which the digital economy propels SMEs towards innovation, examining both the radical advancements they drive and their contributions to non-technological innovation within a globally connected landscape.

4. Digital Economy Help SMEs With Cash Regulation

In the contemporary business landscape, the digital economy emerges as a transformative force, offering Small and Medium Enterprises (SMEs) unprecedented opportunities for optimization and increased trade efficiency. By harnessing digital technologies, SMEs can strategically enhance their financial performance, streamline operational processes, expand their customer base, and foster innovation. This comprehensive exploration delves into the intricacies of how the digital economy functions as a catalyst for optimizing the cost structure of SMEs, driving efficiency gains, and propelling revenue growth.

4.1. Revenue Optimization and Cost Reduction

One of the paramount advantages of embracing the digital economy lies in the optimization of revenue channels and the simultaneous reduction of operational costs. As businesses increasingly leverage digital tools, they can reevaluate and refine revenue streams, identify cost-saving opportunities, and enhance financial performance. A recent study highlighted in the Digital Economy and Society Index (DESI) 2020 reveals that digitalized SMEs exhibit a remarkable 26% higher average revenue compared to their non-digitalized counterparts. This section delves into specific strategies and technologies that enable SMEs to achieve these financial gains, emphasizing the pivotal role of digitalization in reshaping the economic landscape for small and medium-sized enterprises [15].

4.2. Productivity Gains and Access to New Markets

The efficiency gains derived from increased productivity through digitalization constitute another facet of the advantages conferred upon SMEs by the digital economy. By harnessing digital tools, businesses can optimize internal processes, improve resource allocation, and establish a new paradigm for competitiveness. This section explores how the digital transformation journey facilitates productivity gains, providing SMEs with the tools to navigate the complexities of modern business. Moreover, the expanded geographical reach afforded by the digital economy opens doors to new customers, creating opportunities for revenue diversification and business growth. Drawing on insights from the “Analysis Report on Digital Transformation of Small- and Medium-Sized Enterprises (2021 Edition),” it examines the current stage of digital transformation among SMEs, shedding light on the potential for further optimization and growth in the digital era [16].

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5. Recommendations for the Sustainable Development of SEMS

Recommendations for the sustainable development of Small and Medium Enterprises (SMEs) in the digital age emerge from a comprehensive understanding of the challenges and opportunities outlined in the research. Firstly, policymakers should prioritize initiatives aimed at bridging the digital divide, ensuring widespread internet access for SMEs to facilitate their inclusion in Global Value Chains (GVCs) and international trade. Strategic investments in Information and Communication Technology (ICT) infrastructure can enhance SMEs' capabilities, enabling them to harness the transformative potential of the digital economy.

Secondly, heightened cybersecurity measures are imperative. Policymakers and industry stakeholders should collaborate to develop tailored cybersecurity frameworks for SMEs, considering their vulnerabilities and resource constraints. This includes promoting awareness, providing training, and facilitating access to cybersecurity tools and expertise.

Furthermore, fostering a culture of innovation is crucial. Policymakers should incentivize and support SMEs in adopting digital technologies for both technological and non-technological innovations. Collaborative platforms and networks should be encouraged to facilitate global collaboration, knowledge spillovers, and adaptive learning.

Financial optimization can be achieved through targeted support for SMEs' digital transformation. Policymakers should facilitate access to digital tools, encourage the adoption of digital financial technologies, and provide guidance on optimizing revenue channels and reducing operational costs. This may involve creating financial incentives and support programs tailored to the unique needs of SMEs in different sectors and regions.

In essence, a holistic approach encompassing digital infrastructure, cybersecurity, innovation, and financial support is essential for ensuring the sustainable development of SMEs in the digital economy.

6. Conclusions

6.1. Key Findings

One key finding of this research is the transformative impact of the digital economy on Small and Medium Enterprises (SMEs), encompassing various dimensions such as market access, cybersecurity challenges, innovation, and financial optimization. The positive influence of internet-based technologies, including artificial intelligence, the Internet of Things, and blockchain, has propelled SMEs into a realm of expanded market access, enabling them to participate in Global Value Chains (GVCs) and international trade. However, this surge in digitalization has also exposed SMEs to cybersecurity challenges, particularly in the context of the COVID-19 pandemic, highlighting the need for enhanced cybersecurity measures to safeguard their operations.

The study emphasizes the symbiotic relationship between digital technologies and SMEs' innovative capabilities, positioning them as catalysts for economic growth. SMEs, operating outside established paradigms, drive radical innovations and contribute substantially to patent filings. The digital economy facilitates an environment conducive to innovation ecosystems, fostering creativity and adaptability. Furthermore, the research underscores the importance of non-technological innovation and global collaboration, with SMEs navigating challenges and leveraging digitalization to integrate external knowledge seamlessly into their innovation processes.

In the realm of financial optimization, the research reveals that embracing the digital economy allows SMEs to optimize revenue channels, reduce operational costs, and achieve remarkable revenue gains. Digitalized SMEs exhibit a significant 26% higher average revenue compared to their non-digitalized counterparts. The efficiency gains derived from increased productivity through

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digitalization contribute to competitiveness, and the expanded geographical reach afforded by the digital economy opens doors to new markets, fostering revenue diversification and business growth.

6.2. Future Studies

It is evident that the digital economy presents both opportunities and challenges for SMEs, shaping their development trajectory in unprecedented ways. Future studies in this domain should delve deeper into specific industries and geographical regions to provide nuanced insights into the varied experiences of SMEs. Additionally, exploring the role of emerging technologies such as 5G, edge computing, and quantum computing in further transforming SME operations and market presence would be a valuable avenue for research.

Understanding the evolving landscape of cybersecurity threats and developing innovative solutions tailored to the unique challenges faced by SMEs is crucial for ensuring their resilience in the digital age. Future studies could focus on developing comprehensive cybersecurity frameworks and best practices specifically designed for SMEs, considering their resource constraints and distinct operational contexts.

Innovation remains a cornerstone for SMEs' competitiveness, and future research should explore novel ways in which the digital economy can foster innovative ecosystems and collaborative networks. Studying the impact of regulatory frameworks and policy interventions on SMEs' ability to harness the potential of the digital economy would also contribute valuable insights for policymakers and stakeholders. Furthermore, continued research into the financial aspects of SMEs in the digital economy should explore evolving business models, investment patterns, and the role of digital financial technologies.

Understanding the nuanced challenges and opportunities faced by SMEs in different stages of digital transformation is essential for tailoring strategies that promote inclusive growth and sustainable development. The key findings underscore the need for strategic measures in enhancing cybersecurity, fostering innovation, and optimizing financial performance. Future studies should build upon these foundations to ensure the continued resilience and prosperity of small and medium-sized enterprises in the ever-evolving digital landscape.

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