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# Harnessing Disruptive Innovation: A Conceptual Model for SME Growth and Adaptation

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**Abstract:** In the context of sustaining innovation, small and medium enterprises (SMEs) strive to enhance their market position through product improvements. However, globalization and rapid technological advancements pose significant challenges, urging SMEs to integrate innovative capabilities into their business models. Effective SME business model innovation, fueled by customer insights, process efficiency, and technology application, can promote development and unlock additional value-creation resources. Despite this, SMEs encounter difficulties in capitalizing on disruptive innovation due to the competitive, technology-driven, and volatile global market. This study aimed to define a comprehensive conceptual model of disruptive innovation specifically tailored for SMEs. Through an automated content analysis of relevant literature, 13 themes and 82 concepts were identified and categorized into four strategic alignment domains. These domains provide a framework for operationalizing the findings and constructing a conceptual model of disruptive innovation. Utilizing this conceptual model as a checklist can assist SMEs in turning disruption into opportunity, thereby supporting their adaptation and growth in an increasingly competitive landscape.

**Keywords:** disruptive innovation; small and medium enterprise; conceptual model; automated content analysis; strategic planning



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## 1. Introduction

Innovation creates business value and, in a constantly changing market, enables an organization to maintain its success [1,2]. Organizational success may be associated with value creation from new revenue opportunities, from driving more revenue through existing channels, and from optimizing efficacy, resulting in improved performance and productivity [3,4]. The impetus of such sustaining innovation is to protect the position of small and medium enterprises (SMEs) in the market through product improvements [5]. However, the SME market position is impacted by globalization and technological evolution, urging SMEs to address opportunities and threats by adding innovative capabilities to their business models [6]. SME business model innovation, supported by customer insight, process efficacy, and the application of technology, effectively drives SME development [7–9] and enables access to complementary value-creation resources [10–12]. In contrast to sustaining innovation, disruptive innovation empowers SMEs to seize or create new markets by utilizing new technologies and other value-creation resources [13,14]. Disruptive innovation, in this context, is not just an outcome; it is a complete and progressive process [13], enabling SMEs to break into new markets and move higher up the value chain [15]. If managed optimally, the adoption and commercialization of these value-

creation resources and new technologies can enable SMEs to leap-frog the traditional ways of development and innovate [16].

However, external and internal factors inhibit SMEs from optimizing the value of disruptive innovation [1]. One of the biggest challenges that SMEs face, is the competitiveness of the global market that is recognized by its highly demanding, technology-driven, and turbulent environment [17,18]. Resource scarcity, lack of funding, and absence of government support hinder SMEs from implementing these new technologies and disruptive innovation [19,20]. Furthermore, SME disruptive innovation is hampered by limited access to external knowledge sources, such as external social networks, collaboration with research institutions like universities, and partnerships with other organizations (including competitors) to share funding, risks, and rewards [13]. SMEs require greater levels of business association involvement to capture value [6,10,21]. In addition to lacking external knowledge and information, the successful commercialization of disruptive innovation requires cross-boundary cooperation from a diverse range of organizations [22], as SMEs have much more difficulty in completing technological breakthroughs independently [1]. Internally, barriers to disruptive innovation relate to the willingness and support of SME leadership to provide direction and incentives for employees to foster innovation and to actively overcome resistance to change [1,19,20]. A lack of adequate internal SME resources, the absence of a separate organizational structure suitable for disruptive innovation, and inadequate investment in research and development reduce not only new product and service design agility but also the creation of new internal knowledge [16,23].

As SMEs directly impact an economy's gross domestic product (GDP) and are considered the backbone of an economy [24–26], greater levels of business association involvement are required to capture value [6,10,21]. To stay ahead of the competition and achieve an effective disruptive innovation strategy, SMEs should ensure they have a clear plan in place as well as access to the right resources [27,28]. Previous research has mainly focused on specific aspects of disruptive innovation in SMEs, such as market competition [29], resource constraints [30], and managerial discretion [31]. Hence, the purpose of this research paper is to define a holistic conceptual model for SME disruptive innovation by considering the following research question: "What are the components of a comprehensive disruptive innovation conceptual model for SMEs?" By applying such a model, SMEs can transform disruption into opportunity, enabling the development of new business models and access to previously inaccessible markets.

The remainder of this paper is structured as follows: First, the literature review is presented, followed by the methods section, which outlines the research approach. Next, an overview of the findings is provided, along with the recommendations and contributions. Finally, the paper concludes with the conclusion section.

## 2. Background

### *2.1. SME Growth and Development*

Future-oriented SMEs develop their business environments through a multidisciplinary approach, incorporating politics, economics, demography, government, socioculture, and technology [32]. Incorporating technology innovation is among the key growth sources [33], and the effective use of technology in SMEs impacts their competitiveness and access to international markets [34]. Furthermore, technology plays a key role in sustainability [35,36]. Early adopters of technology are more capable of handling uncertainty and risk compared to late adopters, who are generally less willing to take risks and regarded as less venturesome [37–39].

SMEs in Sri Lanka investigated for e-commerce adoption revealed several key aspects related to technology [40]: (i) information technology (IT) adoption is vital for the successful implementation of e-commerce activities; (ii) e-commerce adoption is influenced by management involvement whereby lack of IT knowledge among top management represents an obstacle to adopt e-commerce, while e-marketing contributes to cost minimization, self-marketing and launching products; (iii) supplier service plays an important role in IT

adoption; and (iv) top executives believe that IT adoption reduces costs, saves time, and increases efficiency in dealing with suppliers [40]. Findings from a study conducted by Thomas [41] show that SMEs in the information communication technology (ICT) sector face challenges during the integration of different technologies, namely the need for higher levels of integration coordination, forcing them to invest a substantial amount of resources, as well as asserting fast adaptation due to frequent component changes and upgrades. These factors paved the way for SMEs to consider and optimize cloud solutions as service enablers, provided that SMEs can manage the rigorous small baseline specifications required for cloud utilities [42].

### *2.2. Disruptive Innovation*

Scholars have identified several attributes to categorize disruptive innovation [13,43]. Yu and Hang [44] considered disruptive innovation from an external, internal, marketing, and technology perspective, while Foss and Saebi [45] constructed disruptive innovation recommendations based on the identification of antecedent conditions (e.g., change in competition, stakeholder demands, technologies, and change in strategy), contingencies (e.g., regulation, culture, leadership and adversity to change), and outcomes (e.g., innovativeness and cost reduction) [46,47]. Kilkki et al. [48] suggested that different industries serve different customer needs by offering different types of products where demand and supply then drive digital innovation potential. The rapid evolution of technology and its impact on technology-centric organizations are well recognized [23,49–51], as well as the role of social media in suitable strategic marketing approaches [52,53] and maintaining an entrepreneurial mindset [54,55]. In addition, Da Costa Nogami and Veloso [9] emphasized the application of technology as an effective value creation strategy as it satisfies customer needs based on the discovery and creation of new opportunities. According to Christensen, Raynor, and McDonald [56], disruptive innovators exhibit characteristics that enable them to consistently enhance quality while maintaining low costs for their products and/or services. They strategically define their markets across the entire range—from low-end to highly demanding markets [56,57].

Clayton Christensen [56] is renowned for his theory of disruptive innovation, and for the publication of a number of seminal articles presenting his framework, which describes the method whereby a simplified, accessible, and affordable innovation enters a market at the bottom and then persistently moves upmarket, eventually displacing established competitors [13,23,58]. His framework describes a set of three interdependent elements that work together to successfully enable disruptive innovation power, namely enabling technology, innovative business models, and a coherent value networks [58]. The purpose of *enabling technology* is to simplify and standardize solutions, ensuring that these simplified solutions are delivered to all customers in affordable and easily accessible ways. *Business model innovation* refers to the ability to target and reach new customers, including the least profitable ones. A *coherent value network* describes a network in which distributors, partners, suppliers, and customers all benefit when the innovation thrives ([58], p. xx). Thus, in this instance, the disruptive innovation has the potential to create a new affordable market and value network that may eventually disrupt an already existing market and displaces its market leader [23].

For this study, we will categorize our findings by applying Christensen's framework.

## 3. Materials and Methods

In this research, a qualitative research methodology was adopted. A systematic literature review (SLR) method was used to explore the under-research area of disruptive innovation in SMEs [59–61]. Unlike traditional reviews, the SLR is open and allows for the integration of both practitioner and academic perspectives, enhancing the overall synthesis of existing knowledge [62,63]. A five steps process was followed to determine the relevance and quality of the research papers, namely: (i) identification of keywords, (ii) searching for research articles related to the keywords, (iii) assessing the quality of the research

articles generated by the software, (iv) extracting relevant themes, and (v) synthesizing the identified themes [60,64,65].

In the first step of the SLR execution, keywords using Boolean operators included "disruptive innovation" AND "small and medium enterprise". A search was conducted in Google Scholar, generating a list of 378 research papers. Google Scholar was chosen for its ability to make full-text articles searchable, provide citation information and metrics for the sources that it indexes, and facilitate broad searches for scholarly literature across many disciplines and sources. This aligned well with our goal to understand the disruptive innovation domain related to SMEs. The search results were downloaded using the Publish or Perish Software "https://harzing.com/resources/publish-or-perish (accessed on 24 September 2023)" as suggested by Jacsó [66]. This enabled the research team to proceed to the third step of the SLR process, i.e., quality assessment, by importing the search results into Rayyan software (https://www.rayyan.ai/, accessed on 25 September 2023). Rayyan facilitated the collaborative screening of the papers for relevance to the research question [67].

Figure 1 depicts the outcome of the screening step. Of the 378 research papers, 3 duplicates were removed and 239 were excluded due to text not being in English, lack of relevance to SMEs, and irrelevance to the research question, leaving 139 papers for detailed analysis. Two additional relevant papers identified during the screening process were added, resulting in a final corpus of 141 papers for detailed analysis.

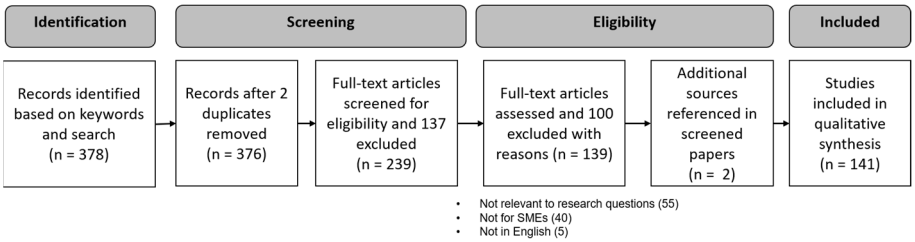


**Figure 1.** Preferred reporting items for systematic reviews and meta-analyses (PRISMA) [68].

Step 4 of the SLR process involved the extraction of relevant themes. We used Leximancer Software version 5.00.140 2021/08/25 to execute an automated content analysis, following the methodological procedure applied by Ghauri et al. [69], Brochado et al. [70] and Prasannath et al. [71] to generate the concept map shown in Figure 2.

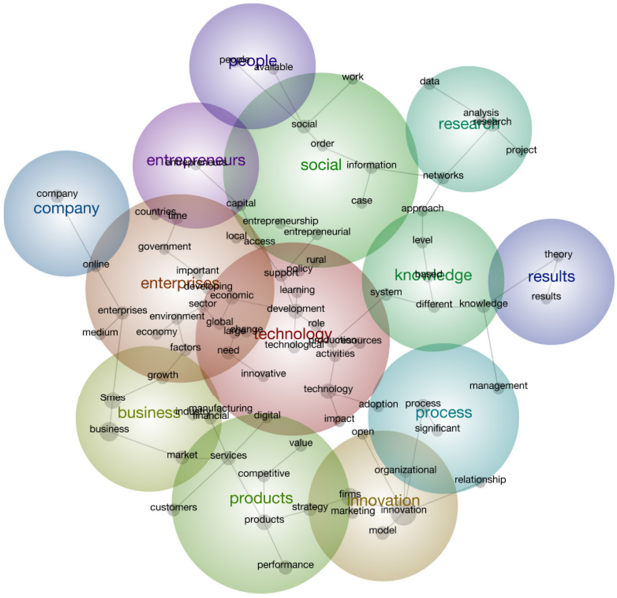


**Figure 2.** Automated content analysis concept map (source: authors' own work).

Table 1 presents the concepts identified during the automated content analysis, the hits which refer to the number of text excerpts that matched each query concept and the associated theme. The analysis produced 13 themes based on 82 concepts.

**Table 1.** Themes and concepts identified (source: Leximancer analysis).

| Theme | Hits | Concepts |
|---|---|---|
| Innovation | 43,428 | Innovation, firms, model, marketing, open, and organizational |
| Technology | 42,703 | Technology, development, economic, need, support, technological, resources, role, activities, innovative, impact, change, learning, large, production, policy, digital, and rural |
| Business | 38,930 | Business, SMEs, market, growth, financial, industry, and manufacturing |
| Products | 33,345 | Products, performance, services, strategy, customers, value, and competitive |
| Enterprises | 29,024 | Enterprises, important, sector, factors, countries, environment, time, government, global, developing, access, economy, medium, and local |
| Research | 24,710 | Research, networks, data, analysis, and project |
| Social | 23,493 | Social, information, entrepreneurial, case, entrepreneurship, order, work, and capital |
| Knowledge | 20,176 | Knowledge, system, different, level, based, and approach |
| Process | 17,758 | Process, management, significant, relationship, and adoption |
| Company | 9514 | Company and online |
| Results | 4844 | Results and theory |
| People | 3701 | People and available |
| Entrepreneurs | 2181 | Entrepreneurs |

In the next section, we describe each of the themes identified in detail. We also map the results to the three pillars of disruptive innovation according to the framework of Clayton Christensen [56] to offer structured insight into how each identified theme contributes to disruptive innovation in SMEs.

## 4. Results

### *4.1. Automated Content Analysis Results: Innovation*

The theme of "Innovation" was identified as the most significant, consisting of the firms, models, marketing, open, and organizational. Innovation is considered a top priority and a crucial resource to increase productivity and competitiveness for SMEs [72]. It involves the introduction of new or significantly improved products or services, production methods, or service delivery processes. It also encompasses changes in marketing strategies and enhancements to the business model, workplace activities and external relationships of the organization [73].

Kuratho [74] states that innovation can be radical, incremental, or disruptive. *Radical* innovation refers to the launching of breakthrough technologies or services; it does not occur too often but has a long-lasting impact and transforms the organization by changing existing markets [7,11]. *Incremental* innovation points to the evolution of a product or the enhancement of a service; it happens on a regular incremental basis. *Disruptive* innovation is more extreme, and radically transforms the organization's business practice, market, and value network [7,41].

Business model innovation (BMI) refers to the way in which an organization operates and how it creates value for its stakeholders. It involves innovative strategies that SMEs use to secure sustainable competitive advantages over their peers and to move towards

top-class performance [75]. BMI is a composite innovation which could take on the form of business model (BM) adjustment, adoption, improvement, or redesign [72]. Successful SMEs innovate multiple elements of their BM, such as products and services, networks, and target markets. They have sought-after networks, respectable customer segments, and they use IT to enhance their offerings [72,76]. SMEs may innovate on their own, or employ consultants or third parties to assist them with the innovation of certain aspects of their BM. According to Taljaard [74], this practice is known as 'open innovation' as it provides for more flexible and fluid innovation processes driven by globalization. Open innovation involves leveraging both internal and external ideas, knowledge, and resources—often from external third-party companies—to create marketable products or services while saving on cost and time [77].

The extract of the relevant disruptive innovation key concepts for SMEs as it pertains to the three pillars of disruptive innovation is shown in Table 2.

**Table 2.** Emerging disruptive innovation key concepts for SMEs: innovation theme.

| Three Pillars of Disruptive Innovation | Theme: Innovation Disruptive Innovation for SMEs |
|---|---|
| Enabling Technology | • Transform business products and services.<br>• Transform business production and service provision processes.<br>• Transform marketing approaches.<br>• Transform business models.<br>• Transform workplace activities.<br>• Transform external relationships. |
| Innovative Business Model | • Adjust, improve and/or redesign business models.<br>• Innovate products (new or enhance existing).<br>• Innovate processes (enhance business practice method).<br>• Innovate target markets (change marketing approach or process).<br>• Innovate operations (change workplace arrangements). |
| Coherent Value Network | • Extend and improve sought-after networks.<br>• Optimize respectable customer segments.<br>• Leverage external resources, such as consultants or other third-party companies to execute innovation (open innovation).<br>• Build global networks for more flexible and fluid innovation. |

### *4.2. Automated Content Analysis Results: Technology*

Technology emerged as the second most significant theme, comprising concepts such as technology, development, economic, need, support, technological, resources, role, activities, innovative, impact, change, learning, large, production, policy, digital, and rural. SMEs' technological resources and capacity play an important role in their ability to develop innovative approaches. This includes the acquisition of new technological equipment and external technological knowledge to support their innovation process; technology to enhance the production process (manufacturing techniques, automation equipment, and real-time sensors); and technology to prepare them for commercialization [76]. The latter is defined as the ability to apply a wide range of technologies to either develop new, sellable products or to improve current products and to deliver these to the market on time [78]. To accomplish technology commercialization from an external source, SMEs need proper contracts, licenses, or strategic partnerships.

However, SMEs are hampered by technological constraints, such as limited access to appropriate technologies, accompanied by a lack of skills and knowledge to operate these technologies [2]. Adegbite and Govender [16] state that African manufacturing SMEs will be able to extend and adapt their business operations rapidly if they succeed in embracing 4IR technologies, such as digitization (internet adoption and e-business), robotics and advanced technology. This could assist them to innovate and remain competitive [2].

Unfortunately, SMEs habitually have a shortage of financial and specialized support and struggle to secure these technologies [18,79]. Adegbite and Govender [16] propose that countries set up hubs for their SMEs to assist them in this regard. Similarly, Escalfoni [80] acknowledges entrepreneurial communities to be the drivers of innovation, which play an important role in the development of technology and in improving the collaboration between industries, entrepreneurs, universities, and support groups who consequently mutually benefit from these relationships.

The extract of the relevant disruptive innovation key concepts for SMEs as it pertains to the three pillars of disruptive innovation is shown in Table 3.

**Table 3.** Emerging disruptive innovation key concepts for SMEs: technology theme.

| Three Pillars of Disruptive Innovation | Theme: Technology Disruptive Innovation for SMEs |
|---|---|
| Enabling Technology | • Procure technological equipment.<br>• Access appropriate technologies.<br>• Source financial and specialized support to secure technologies.<br>• Implement digitization.<br>• Foster internet adoption.<br>• Adopt e-businesses.<br>• Implement robotics. |
| Innovative Business Model | • Acquire skills and knowledge to operate technologies.<br>• Source external technological knowledge to support innovation processes for production and commercialization.<br>• Enhance technological resources and capacities.<br>• Extend and adapt business operations |
| Coherent Value Network | • Commercialize technology contracts from external sources<br>• Secure strategic partnerships licenses<br>• Accomplish technology commercialization from external sources<br>• Utilize hubs and entrepreneurial communities |

### *4.3. Automated Content Analysis Results: Business*

The theme of business, encompassing concepts such as SMEs, market growth, finance, industry, and manufacturing, emerged as one of the most significant themes. SMEs not only play a crucial role in economies, but also significantly contribute to increased business activities and employment levels [81]. Zeng et al. [82] argue that the manufacturing industry is a key driver of social development and economic growth, particularly in developing countries. The niche firm theory provides insights into how SMEs develop specialized, company-specific knowledge related to processes, products, services, distribution channels, or customers, which gives them a competitive advantage in specific market areas. SMEs can be categorized as: (i) in the business start-up phase and still establishing a niche, (ii) struggling and losing their niche position, (iii) stable in an industry-based niche, or (iv) stable in a specialized knowledge-based niche [82].

Traditionally, SMEs have been entrepreneurial businesses that grow through internal financing [83]. However, the need for external financing or acquisition arises when growth outpaces the SME's ability to self-finance or when the SME's technology or market segment attracts significant interest from investors. Developing small-scale Industry 4.0 solutions can increase SME involvement in foreign markets through productive partnerships that leverage Fourth Industrial Revolution (4IR) technologies, leading to the internationalization of SME products. Increased exports and acceptance in international markets can boost sales, driving business growth. Additionally, access to finance enables SMEs to make productive investments, expand their businesses, and acquire the latest technologies, thereby ensuring competitiveness. Conversely, poorly functioning financial systems can

severely undermine a country's microeconomic environment, resulting in lower growth in income and employment [81].

Similarly, the adoption of e-commerce tools allows customers to easily communicate with others [40]. E-commerce provides cost-effective ways for SMEs to market themselves, launch new products, improve communications, gather information, and identify potential business partners [84]. Therefore, e-businesses offer opportunities to transform traditional business strategies into more attractive ones that foster growth in the global market. It also enables SME managers to integrate internal databases with suppliers' or vendors' systems, thereby facilitating customer shopping behaviors [85,86].

The extract of the relevant disruptive innovation key concepts for SMEs as it pertains to the three pillars of disruptive innovation is shown in Table 4.

**Table 4.** Emerging disruptive innovation key concepts for SMEs: business theme.

| Three Pillars of Disruptive Innovation | Theme: Business Disruptive Innovation for SMEs |
|---|---|
| Enabling Technology | • Implement 4IR solutions.<br>• Adopt e-commerce and e-business tools.<br>• Enable supplier and vendor system integration. |
| Innovative Business Model | • Internationalize products.<br>• Increase involvement in foreign markets. |
| Coherent Value Network | • Procure external financing.<br>• Grow investor interest.<br>• Grow productive partnerships |

### *4.4. Automated Content Analysis Results: Products*

Products and services are fundamental to the very existence of firms, particularly for SMEs, which must adopt the right strategies to remain competitive, create value, and achieve high performance. Sołoducho-Pelc [87] defines competitive advantage as an organization's ability to formulate strategies that place it in a favorable position relative to competitors. Competitive advantage arises when customers perceive that they receive greater value from a transaction than they would with a competitor. In today's dynamic market, competitive advantage has garnered significant attention due to its critical contribution to a firm's financial and market performance [88]. Firms adopting a differentiation strategy can offer unique products that provide a monopoly-like advantage over rivals [89].

By aligning process innovations with customer involvement and service customization, firms can create an enhanced competitive advantage, which, in turn, boosts overall performance [90,91]. Innovative companies are more agile, able to quickly identify and adapt to market trends, and thus transform these into competitive advantages and increased customer value [92]. At the strategic level, innovation extends beyond new product development, enhanced services, or the application of disruptive technologies. Managers should also focus on strategies, such as understanding the dynamics of specific customer target markets, optimizing product and service offerings, innovating the value chain—including partnerships and marketing—generating revenue, and sustaining market advantage [93].

In the context of e-commerce, Al-Qaisi [94] advocates that customer knowledge management is crucial for gaining a competitive advantage. It enhances various aspects of business, including the delivery of new products, customer service, and customer satisfaction, ultimately leading to increased profitability and a sustainable competitive edge that rivals cannot easily replicate. Innovation strategies also help companies clarify their competitive advantage by offering differentiated products that create unique value for consumers [95]. If a new product or process is distinct from existing offerings, it becomes challenging for competitors to replicate.

From a manufacturing perspective, employee involvement in new product development leads to better product quality and improved performance. In the hospitality industry, the ultimate goal of all innovations is consistent: to enhance service quality, improve operations, and achieve customer satisfaction, thereby creating competitive advantages that drive financial performance [96,97]. Hospitality companies operate in highly competitive environments, necessitating continuous product and process innovations to differentiate themselves and gain economic advantages [98].

Beyond productivity improvements, technologies of the 4IR, particularly the Industrial Internet of Things (IIoT), offer multiple value creation opportunities for SMEs. The IIoT is poised to drive growth by enhancing product quality, improving customer service, and optimizing firm operations through better planning, more efficient management, and enhanced support functions [16].

The extract of the relevant disruptive innovation key concepts for SMEs as it pertains to the three pillars of disruptive innovation is shown in Table 5.

**Table 5.** Emerging disruptive innovation key concepts for SMEs: products theme.

| Three Pillars of Disruptive Innovation | Theme: Products Disruptive Innovation for SMEs |
|---|---|
| Enabling Technology | • Apply Industrial Internet of Things (IIoT).<br>• Implement disruptive technologies. |
| Innovative Business Model | • Position related to other companies.<br>• Adaptation of differentiation strategy offers unique products.<br>• Customer knowledge management. |
| Coherent Value Network | • Create value along multiple dimensions of business.<br>• Create augmented competitive advantage.<br>• Innovate the value chain.<br>• Enhance customer value. |

### *4.5. Automated Content Analysis Results: Enterprises*

Enterprises was the fifth most significant theme, consisting of the following concepts: important, sector, factors, countries, environment, time, government, global, developing, access, economy, medium, and local. Multiple countries have prioritized the development of SMEs as they stimulate economic growth, lead to broad development, and decrease unemployment [99]. Enterprise activity relies on the availability of capital, human resources, and natural resources [100]. The latter is, in most cases, limited, and companies need innovative ideas to preserve current sources for generations to come, especially those working in the field of renewable energy.

SMEs require access to funding to invest in more contemporary production processes, tools, and technologies, and to enable them to enter new export markets, which will allow them to contribute to their country's economic development [101]. SMEs can utilize 4IR technologies to stimulate productivity, but in many cases need financial support to assist them with acquiring the infrastructure and skills needed to become technology-based firms. This is especially true for SMEs in developing countries [102].

The extract of the relevant disruptive innovation key concepts for SMEs they pertain to the three pillars of disruptive innovation is shown in Table 6.

**Table 6.** Emerging disruptive innovation key concepts for SMEs: enterprises theme.

| Three Pillars of Disruptive Innovation | Theme: Enterprises Disruptive Innovation for SMEs |
|---|---|
| Enabling Technology | • Enter new markets enabled by 4IR technologies |
| Innovative Business Model | • Stimulate economic growth.<br>• Contribute to far-reaching development.<br>• Increase the employment rate.<br>• Enter new international export markets.<br>• Focus on preservation of natural resources. |
| Coherent Value Network | • Invest in more contemporary production processes, tools, and technology.<br>• Acquire infrastructure and skills needed to become technology-based firms. |

### *4.6. Automated Content Analysis Results: Research*

Research serves as the foundational theme for conducting investigations in SMEs. Different sectors of SMEs often employ varied research approaches and methodologies. According to Escalfoni [80], a smart start-up ecosystem requires a technology platform that integrates data to facilitate communication among its members and services. Escalfoni [80]: (i) methods for collecting, examining, and evaluating various technological and social aspects from ecosystem members; (ii) a social network analysis model to measure existing connections within these communities; and (iii) an online platform to operationalize the entire framework. The proposed process encompassed four distinct stages: first, collecting data on various aspects of the ecosystem interactions, technological tools, and social relationships; second, structuring the data for analysis, through organization and categorization; third, visualizing the structured data to provide clear and intuitive representations of network relationships and interactions; and fourth, analyzing the data using social network analysis metrics to derive insights and patterns [80]. By building inference mechanisms for identified network relationships, data analysis efforts can be streamlined. Additionally, adaptive ontologies could offer significant benefits for entrepreneurial communities in big data applications.

In the context of developing a framework of open innovation in SMEs in an emerging economy, Xiaobao et al. [103] affirmed future research should be based on a larger data sample. They recommend extracting medium-sized groups by setting the thresholds, presenting class variables, and conducting further confirmatory analysis. For instance, an empirical investigation of a single case involving a value chain design of a professional services firm in a real-life context was used as research method in order to address the research question [104].

Furthermore, qualitative research methods often involve the collection and analysis of published articles, reports, and seminal texts on innovation management [10]. Data analysis in these methods typically consists of three key stages: (i) managing, (ii) summarizing, and (iii) reconstructing qualitative data. Elmansori [105] emphasizes focusing on the meaning of words rather than quantification in the analysis process, while Chaochotechuang [106] adopted an abductive reasoning method for investigating innovation strategies in new product development within the Thai food and beverage industry.

The extract of the relevant disruptive innovation key concepts for SMEs as it pertains to the three pillars of disruptive innovation is shown in Table 7.

**Table 7.** Emerging disruptive innovation key concepts for SMEs: research theme.

| Three Pillars of Disruptive Innovation | Theme: Research Disruptive Innovation for SMEs |
|---|---|
| Enabling Technology | • Build inference mechanisms.<br>• Apply adaptive ontologies. |
| Innovative Business Model | • Conduct empirical investigations<br>• Observe patterns through scrutinizing data.<br>• Summarize and reconstruct data.<br>• Apply confirmatory analysis.<br>• Apply reasoning method for innovative strategies. |
| Coherent Value Network | • Utilize network relationships.<br>• Apply social network analysis metrics. |

### *4.7. Automated Content Analysis Results: Social*

Theme seven, *social*, encompasses concepts, such as social, information, entrepreneurial, case, entrepreneurship, order, work, and capital. While entrepreneurship is traditionally viewed as profit-driven, there is an increasing focus on "social entrepreneurship", where the primary goal is to generate social benefits. This shift highlights the growing importance of creating positive societal impacts through entrepreneurial activities. Entrepreneurial support organizations (ESOs) play a crucial role in fostering new businesses. These institutions include business incubators and accelerators, co-working spaces, technology and science parks, and government foundations, all of which are dedicated to promoting and supporting entrepreneurship. Their mission is to provide resources, mentorship, and infrastructure to help entrepreneurs succeed and grow their ventures [19].

This theme also highlights smart solutions aimed at improving a community's living standards—economically, socially, and environmentally—through the development of human capital, economic clusters, and incentives for entrepreneurship [19]. Human capital, in the form of education, knowledge, experience, and work skills, provided by entrepreneurs, are key determinants of business success [17].

On the other hand, social capital relies on existing networks and established cultural norms. Trust between stakeholders—entrepreneurs, investors, and other parties—is critical for encouraging resource-sharing [19]. Face-to-face interactions help broaden perspectives and improve business attitudes. Both government and non-state initiatives are essential for supporting entrepreneurship through funding and knowledge-sharing. For example, establishing government-funded investment companies to support private venture capital funds is one effective method [107].

A smart start-up ecosystem emerges when entrepreneurial communities make conscious decisions to address their social and business needs. This involves the aggressive use of new information technologies to create a communication infrastructure that integrates services. Escalfoni and Oliveira [19] applied social network analysis techniques to better disseminate information about start-up ecosystems, aiming to promote the entrepreneurial communities. By studying the network properties, they revealed patterns of interaction between individuals and organizations, improving coordination, community emergence, connectivity, and the relevance of participants.

Face-to-face and digital platforms, national awards, annual summits, and dedicated entrepreneurship portals can facilitate entrepreneurial culture promotion [99]. Furthermore, capacity building for start-ups and SMEs includes soft-skills training, management mentoring, and access to capital. There is a need to actively enhance entrepreneurship by implementing curricular reforms, raising awareness among the youth, and offering effective support mechanisms, such as access to mentoring, and skill-building resources [19].

The ultimate goal of entrepreneurship education policies is to foster an entrepreneurial culture that helps potential entrepreneurs identify and pursue opportunities [108]. Univer-

sity education, for example, should include hands-on enterprise experiences and courses that are designed to encourage an entrepreneurial mindset among students [107]. Incubation centers and entrepreneurship courses at art universities can significantly contribute to increasing entrepreneurial activities, driving economic growth, and improving living standards [109]. However, policies supporting entrepreneurship are only effective if they realign existing incentives toward desired social outcomes [108].

The extract of the relevant disruptive innovation key concepts for SMEs as it pertains to the three pillars of disruptive innovation is shown in Table 8.

**Table 8.** Emerging disruptive innovation key concepts for SMEs: social theme.

| Three Pillars of Disruptive Innovation | Theme: Social Disruptive Innovation for SMEs |
| --- | --- |
| Enabling Technology | • Implement smart solutions to develop the community's living standards.<br>• Host entrepreneurship portals. |
| Innovative Business Model | • Initiate smart start-up ecosystem.<br>• Implement entrepreneurial directed approach.<br>• Obtain venture capital funds for entrepreneurs. |
| Coherent Value Network | • Promote entrepreneurial community.<br>• Utilize incubation centers at universities.<br>• Create a communication infrastructure. |

### *4.8. Automated Content Analysis Results: Knowledge*

The eighth theme, knowledge, includes concepts such as systems and level-based approaches. Central to the Systems of Innovation (SI) approach are networks and informal spaces for technological interaction. This approach emphasizes moving beyond traditional research and development and formal technological practices to incorporate informal, innovative techniques like learning-by-doing, learning-by-using, and learning-by-interacting [110]. In an innovation system, various actors are involved in continuous learning and knowledge exchange. The day-to-day experiences of individuals with new knowledge or innovations play a pivotal role in this system. To drive effective innovation, all actors must cultivate a culture of open communication and knowledge-sharing [111].

Capability building is fostered through both community-based learning and formal knowledge systems [110]. In rural, low-tech clusters, knowledge transfer between experienced and new employees—through informal interactions—plays a critical role in driving innovation. Escalfoni [80] elaborates on this network-based approach by emphasizing social aspects, architecture dimensions, and network indicators. These tools help map and assess relationships between individuals, groups, organizations, and other entities, aiding managerial diagnostics.

A broad, multidimensional, multi-stakeholder perspective—rooted in emerging ideas and trends—should form the basis of a systems approach to proactive situational analysis [21]. Such an analysis is essential for developing enterprise strategy, incorporating new global stakeholders, and avoiding a stagnant or reactionary approach. Searching for knowledge across different domains requires thinking 'outside the box' [107]. The analysis of object behaviors and customer forecasting can benefit from the integration of big data across different applications and IT systems to inform decision-making. Furthermore, existing market realities, combined with the expanding consequences of globalization, compel entrepreneurs to rethink organizational management systems and their future expansion prospects [101]. The integration of knowledge from support professionals and the level of success in achieving innovation strategies depend heavily on the specific organizational design and formal procedures adopted [10].

The extract of the relevant disruptive innovation key concepts for SMEs as it pertains to the three pillars of disruptive innovation is shown in Table 9.

**Table 9.** Emerging disruptive innovation key concepts for SMEs: knowledge theme.

| Three Pillars of Disruptive Innovation | Theme: Knowledge Disruptive Innovation for SMEs |
|---|---|
| Enabling Technology | • Utilize technological incubators.<br>• Apply knowledge transfer system.<br>• Exploit informal technological-information exchanges.<br>• Conduct deep data analysis. |
| Innovative Business Model | • Integrate local knowledge systems.<br>• Apply informal innovative techniques such as learning-by-doing, learning-by-using and learning-by-interacting.<br>• Create business infrastructure linking innovation or knowledge.<br>• Facilitate open communication.<br>• Share knowledge.<br>• Apply systems of innovations (SI) approach.<br>• Execute proactive situational analysis.<br>• Exchange knowledge through informal interaction. |
| Coherent Value Network | • Create a network architecture.<br>• Map relationships among people, groups, organizations, and other entities. |

### *4.9. Automated Content Analysis Results: Process*

Process was the ninth most significant theme, including concepts such as management, significance, relationship, and adoption. Process innovation refers to the development of new or significantly improved delivery or production techniques, using new software, machinery, or methods, which can offer a competitive edge in the market. According to Ahmed [112], process innovation significantly impacts the performance of SMEs and is vital for their survival in highly competitive environments. Many SMEs have adopted e-commerce (the integration of business procedures, items, services, and processes in an online environment) to innovate their business processes [113], enabling them to overcome geographical limitations and compete in both national and international markets [40]. Abbad et al. [113] found a positive relationship between e-business adoption and SME performance.

Mukundan and Thomas [114] identify employee involvement, organization learning capability, creative capacity, and external networking as having the most substantial influence on SME process innovation. The effective management of these processes ensures that disruptive innovations are developed and adopted by SME customers efficiently [40]. Process innovation is significant when it addresses real market needs, solving a problem in a unique way. Building strong relationships with customers is crucial for driving the adoption of the innovations [115]. This could involve customer engagement through social media, personalized support, or soliciting feedback to improve the innovation continuously. SMEs also leverage social media to advertise and market their products and services. This enables them to reduce costs while building their customer loyalty.

The extract of the relevant disruptive innovation key concepts for SMEs as it pertains to the three pillars of disruptive innovation is shown in Table 10.

**Table 10.** Emerging disruptive innovation key concepts for SMEs: process theme.

| Three Pillars of Disruptive Innovation | Theme: Process Disruptive Innovation for SMEs |
|---|---|
| Enabling Technology | • Improve e-commerce.<br>• Innovate business processes.<br>• Enhance advertising and marketing of products and services.<br>• Personalize support to customers.<br>• Solicit customer feedback. |
| Innovative Business Model | • Involve employees.<br>• Grow organization learning capabilities.<br>• Grow creative capacity. |
| Coherent Value Network | • Improved external networking.<br>• Build strong relationships with customers to drive innovation adoption. |

### *4.10. Automated Content Analysis Results: Company*

The company theme includes two concepts, namely, company and online. This theme focuses on companies that are shifting manual processes online to reduce both financial and time costs [7], while improving their brand presence [116,117]. An in-depth understanding of various online aspects is required, such as e-procurement [117], patent creation support, online service, and maintenance [118], and platforms that encourage companies to innovate and accommodate online players [19]. Accommodating online engagement is critical, as most millennials prefer digital interaction [7]. Toolkits that guide businesses on how to engage online, with clear and staged instructions, are invaluable resources [118].

The idea of value creation plays a central role in customer engagement, which is supported by resource and process efficiency, as well as product innovation [119]. SMEs must define their online value proposition (OVP), explicitly clarifying their online offerings and identity [120]. From a data perspective, this includes creating an online database of people and companies in the start-up sectors' friendship networks [4], and e-services that enable online company registration, web-first presence, and customer experience, which are designed for the efficiency that small businesses require [116].

Another key aspect of the company theme is funding and lending activity. Access to new data sources and insights, such as ways to segment lenders in the ecosystem via a product, must be enabled [116]. This segmentation supports digital customer targeting techniques [19] and improves offerings and communication with SMEs [121]. Additionally, online services that provide SMEs with a consolidated view of their finances, such as invoicing, payment monitoring, cash flow management, paying suppliers, and payroll processing, can significantly improve financial management [116]. Websites that list accelerators and manage online application processes also play an important role in fostering growth [121].

The extract of the relevant disruptive innovation key concepts for SMEs as it pertains to the three pillars of disruptive innovation is shown in Table 11.

**Table 11.** Emerging disruptive innovation key concepts for SMEs: company theme.

| Three Pillars of Disruptive Innovation | Theme: Company Disruptive Innovation for SMEs |
|---|---|
| Enabling Technology | • Implement automation, e.g., e-procurement.<br>• Adopt on-line platforms and services.<br>• Implement financial solutions e.g., invoice customer. manage cash flow, process payments, pay suppliers, etc. |
| Innovative Business Model | • Reduce financial and time costs.<br>• Drive product innovation.<br>• Prioritize process efficacy.<br>• Offer on-line value proposition. |
| Coherent Value Network | • Utilize patent creation support.<br>• Foster friendship networks, i.e., active supporters of SME activities.<br>• Segment lending market.<br>• Access SME accelerators. |

### *4.11. Automated Content Analysis Results: Results*

The result theme encompasses concepts related to business performance outcomes and theoretical models that support business model evolution and success. SMEs may transition from self-funding (internal equity) to external equity, typically sourced from private equity investors or bank financing [122]. The relevance of internal finance, external equity, and debt financing for SMEs, may be analyzed through the lens of the "bridged pecking order theory", creating a strategic net to commercialize a radical innovation [41]. Strategic net, in this context, refers to strategy centers that implement powerful tools for strategy development and execution [121,122].

Moore and Manring [21] discuss experimental game theory results, which suggest that linking individuals through networks fosters interdependence. This interdependence makes cooperation much more efficient than conflict or competition [123]. This comparison between large transnational enterprises and SMEs in a cyber-physical world requires evaluating the impact of agile, decentralized networks of SMEs that pursue mutually beneficial transactions versus the few large multinational firms aiming for market dominance [21].

Resource-based theory emphasizes the importance of firm-specific capabilities or competencies, and resources in shaping strategy formulation and implementation [124]. These resources are considered fundamental determinants of firm performance. Competitive advantages arise when a firm effectively utilizes these resources in alignment with external market conditions to achieve above-average profits [125]. This theory is further supported by research outlining the impact of social capital on firm success [121].

The extract of the relevant disruptive innovation key concepts for SMEs as it pertains to the three pillars of disruptive innovation is shown in Table 12.

**Table 12.** Emerging disruptive innovation key concepts for SMEs: results theme.

| Three Pillars of Disruptive Innovation | Theme: Results Disruptive Innovation for SMEs |
|---|---|
| Enabling Technology | • Utilize market simulations |
| Innovative Business Model | • Evolve business models.<br>• Drive commercialization.<br>• Move from self-funding to external equity. |

**Table 12.** *Cont.*

| Three Pillars of Disruptive Innovation | Theme: Results Disruptive Innovation for SMEs |
|---|---|
| Coherent Value Network | • Develop a strategic net, i.e., powerful tools for strategy development and execution.<br>• Apply experimental game theory i.e., games developed to mimic market behavior. |

### *4.12. Automated Content Analysis Results: People*

The people theme addresses the challenges SMEs face in recruiting suitable candidates for senior positions, where a lack of experienced individuals available for hire poses significant difficulties [99]. On the other hand, filling junior positions is generally more straightforward [74,99]. Sarasvathy [126] suggests a "frugal innovation" approach, where businesses start with available resources and build capacity by creating simple products or services often driven by necessity and limited means [127]. This type of innovation, born out of necessity, typically involves people closest to the problem, who then drive the solutions.

Innovation with limited resources requires individuals to share knowledge and ensure that information is accessible, enabling better outcomes [81,127]. It is crucial for aspiring entrepreneurs in fields like app development or fish farming for food security to have easy access to both public and private resources, including financial, non-financial, and technical services [126]. A comprehensive set of competencies is required, including interpersonal abilities, abstract conceptualization, and reflective observation, which help individuals make abstract connections that may not be immediately obvious [74].

The extract of the relevant disruptive innovation key concepts for SMEs as it pertains to the three pillars of disruptive innovation is shown in Table 13.

**Table 13.** Emerging disruptive innovation key concepts for SMEs: people theme.

| Three Pillars of Disruptive Innovation | Theme: People Disruptive Innovation for SMEs |
|---|---|
| Enabling Technology | • Apply financial services.<br>• Grow non-financial services. |
| Innovative Business Model | • Build human resource capacities.<br>• Hire talent.<br>• Apply frugal innovation process, i.e., innovating with limited resources. |
| Coherent Value Network | • Source information providers. |

### *4.13. Automated Content Analysis Results: Entrepreneurs*

The entrepreneurs theme focusses on the perceived profile, skills, and competencies that are required for entrepreneurial success. Leadership, alertness, and gradual accumulation of small successes, complement each other [127] and are essential for guiding emerging business opportunities [16]. Entrepreneurs require specific competencies, especially in a globally-connected, cyber-physical world, to enhance intellectual capital. This often involves engaging other entrepreneurs to exchange knowledge and foster innovation.

Disruptive technologies, such as 3D printers, increasingly enable entrepreneurs to start businesses with lower barriers to entry. Innovative entrepreneurs demonstrate the ability to evaluate multiple ideas, helping to identify true opportunities for SMEs in the context of the Fourth Industrial Revolution (4IR) [74]. The extent to which entrepreneurs' abilities

align with their personal characteristics suggests that absorptive capacity—the ability to understand and apply new intellectual capital—is key to entrepreneurial success [74,128].

However, entrepreneurs often face high costs for training and advisory services, even if they manage to secure seed or venture funding. Therefore, efforts should target young, highly educated, and ICT-savvy entrepreneurs to help them start and thrive in the digital economy [129].

The extract of the relevant disruptive innovation key concepts for SMEs as it pertains to the three pillars of disruptive innovation is shown in Table 14.

**Table 14.** Emerging disruptive innovation key concepts for SMEs: entrepreneurs theme.

| Three Pillars of Disruptive Innovation | Theme: Entrepreneurs<br>Disruptive Innovation for SMEs |
|---|---|
| Enabling Technology | • Grow ICT savvy. |
| Innovative Business Model | • Build entrepreneurial profiles, competencies, and skills.<br>• Foster leadership and alertness.<br>• Steer emerging business possibilities.<br>• Enhance intellectual capital. |
| Coherent Value Network | • Grow talent network. |

## 5. Discussion

To operationalize the findings of this study, we adopted the framework by Reksoatmodjo et al. [130], which highlights four strategic alignment perspectives between IT and business strategies: technology potential (evaluating the implementation of the selected business strategy by aligning it with the appropriate IT strategy), strategy execution (indicating that the business strategy solely drives all domains), competitive potential (leveraging IT to deliver strategic capabilities), and service level (creating a world-class IT service organization). The themes identified in the content analysis were mapped to these four alignment perspectives, as shown in Tables 15–17.

**Table 15.** Disruptive innovation in SMEs: pillar of enabling technology across strategic alignment domains.

| Alignment Domain | Key Initiatives |
|---|---|
| Competitive Potential | • Transform business products and services through the adoption of disruptive technologies (e.g., IoT and robotics).<br>• Enhance marketing approaches with digital tools and data analytics.<br>• Utilize 4IR technologies to open new markets and drive customer engagement.<br>• Leverage e-commerce tools and automation for expanding international market reach.<br>• Host entrepreneurship portals to connect with customers and partners.<br>• Use technological incubators to foster product and service innovation. |

**Table 15.** *Cont.*

| Alignment Domain | Key Initiatives |
| --- | --- |
| Strategy Execution | • Automate business processes (e.g., e-procurement, online service platforms) to streamline operations.<br>• Implement real-time data sensors and digital technologies in production and service delivery processes.<br>• Collect customer feedback using digital tools and integrate it into business improvement efforts.<br>• Apply robotics and other digital innovations to optimize business efficiency and reduce operational costs. |
| Technology Potential | • Procure appropriate technological equipment to enhance production and innovation.<br>• Access external technological knowledge, especially for scaling operations.<br>• Implement smart solutions and digitization (e.g., e-business, robotics, 4IR solutions) to improve efficiency and adaptability.<br>• Adopt cloud computing and SaaS platforms to drive business flexibility and scalability.<br>• Integrate Industrial IoT (IIoT) to automate manufacturing and business processes. |
| Service Level | • Use digital platforms to enhance customer interactions and improve service delivery (e.g., online customer portals, AI-driven customer service).<br>• Apply IT solutions to integrate supplier and vendor systems.<br>• Use online platforms to streamline financial operations (e.g., invoicing, payments, cash flow management).<br>• Adopt AI and data analytics to optimize customer support and personalize services.<br>• Leverage adaptive ontologies to improve external relationships and service offerings. |

**Table 16.** Disruptive innovation in SMEs: pillar of innovative business model across strategic alignment domains.

| Alignment Domain | Key Initiatives |
| --- | --- |
| Competitive Potential | • Adjust, improve, and redesign the business model to stimulate economic growth and access new markets (including international export markets).<br>• Focus on preserving natural resources and sustainability efforts.<br>• Adopt a differentiation strategy to offer unique products that meet specific customer needs.<br>• Implement entrepreneurial-directed approaches and informal innovative techniques (learning-by-doing and learning-by-using).<br>• Manage customer knowledge for continuous market adaptation. |
| Strategy Execution | • Innovate product offerings (either by developing new products or enhancing existing ones) and business processes (through operational changes).<br>• Adapt business operations to align with evolving markets.<br>• Involve employees in the innovation process to drive growth in creative and organizational learning capabilities.<br>• Utilize knowledge-sharing practices (informal interactions) to drive business improvements and reduce operational costs. |

**Table 16.** *Cont.*

| Alignment Domain | Key Initiatives |
| --- | --- |
| Technology Potential | • Source external technological knowledge to support innovation in production and commercialization efforts.<br>• Enhance technological resources and capacities to foster innovation (e.g., smart start-up ecosystems).<br>• Integrate local knowledge systems and apply a systems of innovations (SI) approach for continuous technological adaptation.<br>• Build infrastructure that link innovation with knowledge systems. |
| Service Level | • Foster operational efficiency by restructuring workplace environments and acquiring skills to manage new technologies.<br>• Conduct empirical investigations and data analysis to refine innovative strategies.<br>• Develop proactive situational analysis and confirmatory analysis processes.<br>• Position the business in relation to competitors and secure external equity to enhance business sustainability. |

**Table 17.** Disruptive innovation in SMEs: pillar of coherent value network across strategic alignment domains.

| Alignment Domain | Key Initiatives |
| --- | --- |
| Competitive Potential | • Build global networks for more flexible and fluid innovation.<br>• Secure strategic partnerships and licenses to support innovation.<br>• Invest in contemporary production processes and technology.<br>• Strengthen customer relationships to drive innovation adoption and create value across multiple business dimensions.<br>• Leverage patent creation support and access SME accelerators to segment the lending marker and enhance competitive advantage. |
| Strategy Execution | • Optimize respectable customer segments and commercialize technology contracts from external sources.<br>• Innovate the value chain through social network analysis and create communication infrastructure to support innovation.<br>• Develop a strategic net, i.e., powerful tools for strategy development and execution.<br>• Apply experimental game theory to mimic market behavior and refine business strategies. |
| Technology Potential | • Accomplish technology commercialization from external sources and acquire infrastructure and skills to transition into technology-based SME.<br>• Build a robust network architecture to manage these technologies.<br>• Leverage information providers to enhance technological capabilities. |

**Table 17.** *Cont.*

| Alignment Domain | Key Initiatives |
| --- | --- |
| Service Level | • Extend and improve networks by leveraging external resources such as consultants and third-party companies to support open innovation.<br>• Utilize hubs and entrepreneurial communities to foster collaboration.<br>• Promote entrepreneurial communities and utilize university incubation centers to support innovation.<br>• Foster friendship networks to grow support for SME activities and enhance talent networks. |

This mapping allowed us to categorize the findings from the three pillars of disruptive innovation (see Tables 2–14) into more granular strategic domains, providing a clearer understanding of how SMEs can implement disruptive innovation across various aspects of their business.

The initiatives outlined in Table 15 emphasize the role of enabling technology across the four strategic alignment domains. The *competitive potential* theme highlights transforming business models, products, and services to stay competitive. This includes enhancing marketing strategies through digital tools and data analytics, personalizing customer interactions, and leveraging technology incubators and entrepreneurship portals to drive innovation. This theme also emphasizes the importance of adopting disruptive technologies, such as IIoT and robotics, and expanding marker-reach through e-commerce tools and automation. Knowledge transfer systems and conducting in-depth data analysis using market simulations further refine business strategies. *Strategy execution* focuses on transforming production and service delivery through innovation and automation. By implementing technologies, such as e-procurement, real-time data sensors, and robotics, SMEs can improve operations, reduce costs, and enhance efficiency. Additionally, using digital tools to collect and act on customer feedback helps align operations with strategic objectives and improve overall service delivery. The *technology potential* domain emphasizes the importance of procuring and adopting the right technologies to drive growth and innovation. SMEs can leverage external technological knowledge and partnerships to scale their operations, enhance digitization, and adopt 4IR technologies, such as IIoT and robotics. This facilitates the automation of manufacturing processes, entry into new markets, and significant improvements in e-commerce capabilities, while cloud computing and SaaS platforms enhance scalability and flexibility. The *service level* theme focuses on enhancing both customer experience and external relationships through technology-driven service delivery. Additionally, adopting online platforms for financial management, e.g., invoicing, payments, and cash flow management) and using adaptive technologies, such as ontologies to improve relationships, ensure a dynamic, responsive service environment that can evolve with market demands.

The initiatives outlined in Table 16 emphasize the role of an innovative business model across the four strategic alignment domains. The *competitive potential* theme highlights evolving and redesigning the business model to drive product innovation, process efficiency, and commercialization. By innovating target markets, stimulating economic growth, and entering new international markets, businesses can contribute to significant development while preserving natural resources. This theme also highlights the importance of customer knowledge management, adopting differentiation strategies, and fostering an entrepreneurial mindset. Through informal, innovative techniques and enhancing intellectual capital, businesses can link innovation with knowledge, build robust infrastructures, and seize emerging opportunities. The *strategy execution* theme focuses on driving innovation across products and processes while extending and adapting business operations. By involving employees, fostering open communication, and sharing knowledge,

organizations can grow their learning and creative capacities. This approach not only reduces financial and time costs but also builds human resource capacities through talent acquisition and frugal innovation processes, enabling businesses to innovate effectively even with limited resources. The *technology potential* theme emphasizes leveraging external technological knowledge to drive innovation in production and commercialization. By enhancing technological resources and capacities, organizations can build a dynamic smart start-up ecosystem that integrates local knowledge systems. Applying a Systems of Innovation (SI) approach facilitates a holistic view of technology development, while offering online value propositions ensures broader market reach and engagement. This integrated strategy supports sustainable growth and competitive advantage in an increasingly digital landscape. The *service level* theme focuses on advancing operational efficiency through innovative workplace arrangements and acquiring the necessary skills to operate new technologies. This involves conducting empirical investigations, observing data patterns, and applying confirmatory analysis to refine and innovate strategies. By summarizing and reconstructing data, organizations can position themselves effectively against competitors and leverage venture capital to support entrepreneurs. Proactive situational analysis and a shift from self-funding to external equity further enhance their capacity to adapt and thrive in a competitive landscape.

The initiatives outlined in Table 17 emphasize the role of the coherent value network across the four strategic alignment domains. The *competitive potential* theme focuses on building global networks to foster flexible and fluid innovation. Securing strategic partnerships and licenses, along with investing in modern production processes and technologies, enhances competitive advantage. Strengthening customer relationships drives the adoption of innovation and creates value across various business dimensions. By leveraging patent creation support, segmenting lending markets, and accessing SME accelerators, organizations can amplify their competitive edge and enhance overall customer value. To effectively execute a strategy, organizations should focus on optimizing their respectable customer segments and commercializing externally sourced technology contracts. This involves innovating the value chain through social network analysis and building a robust communication infrastructure. Social network analysis can help enhance the understanding of stakeholder interactions, while experimental game theory using market-mimicking simulations refines strategic decision-making. Developing a strategic net, which includes a suite of powerful tools for strategy development and execution, provides comprehensive support for these initiatives and fosters a dynamic approach to achieving strategic goals. Harnessing *technology potential* emphasizes the commercialization of technology sourced externally and the acquisition of necessary infrastructures and skills to transition into technology-based operations. Building a robust network architecture is crucial for effectively integrating and managing these technologies, while sourcing reliable information providers ensures access to valuable insights and data. This comprehensive approach enables firms to leverage technological advancements, enhance their capabilities, and drive innovation within their industry. The *service level* theme focuses on expanding valuable networks to improve service offerings. External resources, such as consultants and third-party companies, can drive open innovation, while hubs and entrepreneurial communities foster collaboration. Strengthening network relationships aids in procuring financing, growing investor interest, and developing productive partnerships. Promoting entrepreneurial communities and utilizing university incubation centers further support innovation efforts. Mapping relationships among entities and fostering friendship networks also help grow talent networks, bolstering support for SME activities and enhancing overall service levels and operational effectiveness.

## 6. Conclusions

The objective of this study was to investigate and define the components of a comprehensive disruptive innovation conceptual model for SMEs. Using an SLR combined with automated content analysis, 13 themes and 82 concepts were identified from the selected

corpus, based on specific keywords. These themes were then categorized and mapped to the three pillars of disruptive innovation, enabling technology, innovative business models, and coherent value networks, thereby providing a clear framework for understanding how disruptive innovation can be operationalized in SMEs.

To further refine the conceptual model, we mapped the findings to four strategic alignment domains: technology potential, strategy execution, competitive potential, and service level. This approach allowed for a more granule categorization of the themes, linking them directly to business and IT strategy alignment, which is critical for SMEs navigating disruption. The model, presented as a checklist in Tables 15–17, offers SMEs actionable guidance for turning disruption into opportunity by leveraging technology, redesigning business models, and building robust value networks.

Future research should focus on collecting empirical data related to the implementation and impact of this proposed disruptive innovation conceptual model in SMEs. In addition, exploring the applicability of the model across different regional contexts and within specific SME sectors in developing countries could provide valuable insights for further refinement and adoption.

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