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Research Article

Exploration of Sustainable SME Business Integration Models Towards Environmental Resilience in Batu City and Bali

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ABSTRACT

Introduction: SMEs play a central role as the locomotive of the economy, especially in areas rich in local wisdom and economic potential. SMEs to develop new products, improve operational efficiency, and explore wider market opportunities.

Objectives: This study aims to explore and identify sustainable business integration models for small and medium enterprises (SMEs) that contribute to environmental resilience in Batu City and Bali. The study aims to know how SMEs can incorporate sustainability into their operations as well as enhance ecological resilience in these areas.

Methods: Qualitative and quantitative approaches are applied in this study to analyze the integration of e-navigation, green finance, and business cooperation among SMEs in Batu and Denpasar, Bali. The data were collected through the application of in-depth interviews and questionnaires, assessed using SEM-PLS in a bid to cross-validate the variable relationship. There were 790 SMEs, where 266 utilized the Slovin formula.

Results: SMEs of the two zones were increasingly and more inclined towards practices such as waste reduction, resource efficiency, and the use of renewable energy, the study found. In particular, eco-tourism and organic agriculture businesses are leading the way in environmental resilience. The research identified several successful integration models that align with both economic viability and environmental sustainability.

Conclusions: External factors affect the environmentally friendly environment. Adoption of environmentally friendly influences the environmentally friendly environment. External factors affect the transformation of SMEs. Adoption of environmentally friendly influences the transformation of SMEs. Environmentally friendly environment influences the transformation of SMEs. External factors affect the transformation of SMEs through environmentally friendly environment. Adoption of environmental innovation has a significant influence on the transformation of SMEs through environmentally friendly environment.

Keywords: Digital Navigation, Green Finance, Collaborative Business, Environmental Sustainability.

INTRODUCTION

In recent years, the evolution of digital technology has dramatically changed the face of global business. This phenomenon is especially visible in the Small and Medium Enterprises (SME) sector, which continues to adapt quickly to take advantage of the opportunities offered by the digital revolution. Based on the Ministry of Cooperatives (Ministry of Cooperatives and SMEs) held Reflection 2022 and Outlook 2023 on Monday (26/12) there are still 20.76 million SMEs on boarding digital In addition, the Ministry of Cooperatives and SMEs Research with UNDP in October 2021 revealed that almost 95 percent of more than 3,000 SMEs showed interest and support for environmentally friendly business practices, increasing awareness of the importance of environmental sustainability has triggered a change in the business paradigm, with more and more companies trying to integrate sustainability principles into their strategies in the Batu and Bali areas, which are major tourist destinations in Indonesia, small and medium enterprises play an important role in the local economy. SMEs play a central role as the locomotive of

the economy, especially in areas rich in local wisdom and economic potential (Hanim et al., 2021). Batu City is known for its natural beauty and tourism potential, while Bali is known internationally as a tourism destination, creating a unique one for this study. These two regions have different characteristics that allow for a deeper understanding of the dynamics of SMEs in different environments. The selection of these regions was not only based on geographical aspects, but also involved socio-economic and cultural factors that influence the development of SME businesses (Razali & Azman, 2021).

Amidst these changes, many SMEs are still constrained in integrating digital technology into their business models, gaining access to adequate funding sources, and establishing sustainable collaboration with other parties in the business ecosystem in the era of ongoing digital transformation (Chalimi et al., 2022), (Asadi & Sularsih, 2022). In facing the challenges and opportunities faced by Small and Medium Enterprises (SMEs) in the era of rapid digital transformation, a deep understanding of digital navigation, environmentally friendly funding models, and collaborative business is a must. (Tulungen et al., 2022) Digital transformation has changed the way SMEs operate and compete (Sularsih & Wibisono, 2021). Through digital navigation, SMEs can leverage technology to expand market reach, improve operational efficiency, and adapt to changing market demands (Vrontis et al., 2022). SMEs that implement digital navigation well tend to experience an increase in Sales conversion rates (Dethine et al., 2020). The use of digital navigation technology increases the likelihood of converting online traffic into actual sales (Pascual, 2023). Digital navigation strategies can also contribute to the sustainability of SME businesses by enabling the adoption of environmentally friendly business practices. In addition to digital navigation, strong funding is needed for SMEs, of course this requires appropriate regulations (Farida & Setiawan, 2022), (Sularsih & Nasir, 2021). While proper regulation can encourage market growth, inadequate regulation can be a barrier to SME growth (Coffee Jr et al., 1988).

One of the main challenges faced by SMEs is access to adequate funding to support their business growth and development. However, more and more investors and financial institutions are realizing the importance of financing green projects. Green financing has increased rapidly in recent years, with the emergence of financial instruments such as green bonds and social venture financing. Green financing refers to the practice of providing funds or investments that take into account the environmental impact of the project or activity being funded. Green financing is to ensure that financial resources are allocated to projects that support environmental protection, greenhouse gas emission reduction, natural resource conservation, and clean technology development. Green financing can be done through various financial instruments, including green bonds, sustainable loans, and social venture investments or venture capital that focus on businesses that have a positive impact on the environment. By encouraging green financing, it is hoped that there will be a shift towards a more sustainable and environmentally friendly economy, which takes into account the needs of the natural environment as well as social welfare. This is also an important part of the global effort to address climate change and improve the ecological balance.The importance of new funding in supporting SME growth (Surya et al., 2021). SME funding shows that access to diverse funding sources allows SMEs to develop new products, improve operational efficiency, and explore wider market opportunities (Candraningrat et al., 2021). A deep understanding of current funding is key to providing the right financial resources for SMEs in both regions (Hasan et al., 2022). Collaborative business is promoted as a key strategy to achieve sustainability. Collaboration between SMEs, with large companies or fellow SMEs, is expected to build profitable synergies and increase business competitiveness in the region (Sarbana et al., 2023). The importance of business collaboration in improving SME sustainability, that collaboration between SMEs with non-governmental organizations, academic institutions, and large companies can increase access to resources, knowledge, and markets needed for sustainable growth (Das & Rangarajan, 2020). Digital technology can enable more efficient information exchange, better coordination, and faster innovation among collaboration partners (Liu et al., 2022). To increase understanding and awareness of alternative funding models and collaborative business, as well as strategies to improve collaboration between SMEs with other business actors and the government in developing sustainable businesses (Purbadharmaja & Widanta, 2023), (Ekwere, 2016). Based on this, the formulation of the research problem is how to create an effective business integration model for SMEs in Batu and Bali that includes digital navigation, green financing, and sustainable business collaboration to support environmental sustainability and improve business performance in the Batu City and Bali regions. The purpose of this research is to formulate, test, and evaluate and explore an integrated model that combines digital navigation, green financing, and business collaboration to support the sustainability of SMEs in Batu and Bali. The problem-solving approach involved a combination of field research, data analysis, and collaboration with local stakeholders such as local governments, financial institutions, and businesses. The focus

was on identifying key challenges, developing an appropriate sustainability business integration model, and implementing it with the support of digital technology.

State of the art research on the exploration of the concept of sustainable business integration model for SMEs towards environmental resilience in Batu and Denpasar City, Bali, is an interesting and important research area to note. However, the gap in previous research where most previous studies have focused on descriptive or qualitative analysis of SME sustainability practices without considering environmental factors and Previous research has identified the importance of SME business integration with sustainability principles, in addition Previous research tends to focus on separate aspects of SME business integration into sustainability practices, such as the use of digital technology or alternative funding. The lack of research that integrates key variables (digital navigation, green funding and collaboration) holistically in the context of environmental resilience in Batu and Bali, in addition to not taking into account the unique context of Batu and Denpasar City, Bali, because they have different cultures, business infrastructures, and challenges faced by SMEs in both cities. Through a multidimensional approach, the preliminary study approach covers three main dimensions (digital navigation, green funding and collaboration), providing a holistic understanding of the problems faced by SMEs towards environmental resilience.

The novelty of this research is that although many studies have been conducted on digital transformation and alternative funding strategies, there has been no research that comprehensively investigates the integration between digital navigation, green funding, and sustainable SME business collaboration towards environmental resilience in Batu and Bali. This research will fill this gap by creating a holistic and sustainable framework.

METHODS

In the study, researchers used several relevant research approaches, including: In the first year using a qualitative approach. The qualitative approach was used to understand in depth how SMEs in the Batu and Bali areas utilize Digital navigation, green funding and collaborative business in developing their businesses. This approach allows researchers to understand the social and cultural context from the perspective of business actors. The quantitative approach was used to measure the extent to which there is a significant difference between SMEs that use digital navigation and those that do not use it by conducting a regression analysis to determine whether there is a relationship between the level of green funding and the level of SME business collaboration, and Identifying the correlation between these factors to assess the extent to which the use of digital navigation is related to SME business funding and collaboration. This study was conducted by collecting data through interviews and distributing questionnaires. This study can obtain data on the integration of digital navigation models, green funding and Business Collaboration that can be applied to SMEs, such as venture capital financing, financing through crowdfunding, or financing through bonds. In addition, this study can also obtain information on collaborative business strategies that can improve SME performance, such as partnership strategies, alliance strategies, or networking strategies.

The population in this study is all SMEs in the Batu City area and in Denpasar Bali. The determination of the Batu City and Bali areas is because both locations have significant diversity in the SME sector including tourism, crafts, culinary, and others. This diversity allows for comprehensive insight into the integration of SME businesses from various sectors so that it can provide an understanding of the challenges and opportunities for different business integrations in each sector, in addition SMEs are often the backbone of the economy in areas such as Batu City and Denpasar City Bali. Focusing on the integration of SME businesses in Batu City and Denpasar City Bali can provide insight into the potential for economic growth and the impact of business integration on the local economy and have different levels of technological advancement and connectivity. This can affect how SMEs in both regions adopt and utilize digital navigation, so it is important to explore these differences, while research can be selected with the following criteria: SMEs that have been operating for at least 5 years, SMEs that have growth potential and are developing well, SMEs that need alternative funding to improve business performance, SMEs that are open and willing to carry out collaborative business cooperation with other parties, and SMEs that have used digital navigation. Based on these criteria, the population was obtained as many as 790 SMEs consisting of 394 SMEs in Batu City and 396 SMEs in Denpasar.

Samples were taken from collaborative business actors who have succeeded in implementing digital navigation models, green funding and collaborative businesses in SMEs in the Batu City and Depansar City areas of Bali. By

selecting a representative sample, the research results can be more accurate and can be generalized to the population of SMEs in the Batu City and Depansar City areas of Bali in general. Determination of the number of samples will be carried out using the Slovin formula as explained byThe Last Supper (2011). Thus the number of samples is 266 SMEs.

This study uses qualitative and quantitative approaches in data analysis. Data collection was conducted through a survey of SMEs in Batu City and Denpasar, Bali, to understand business practices, use of digital technology, access to funding, and the level of business collaboration. In addition, in-depth interviews were conducted with stakeholders, such as SME owners, technology companies, financial institutions, and local governments, to gain deeper insights into business integration and sustainability.

Qualitative data from interviews were analyzed to identify perceptions and experiences related to sustainable SME business. Meanwhile, quantitative data were analyzed using statistical methods with the Structural Equation Modeling Partial Least Squares (SEM-PLS) approach. This method is used to test the relationship between variables such as digital navigation, green funding, business collaboration, and SME sustainability practices. SEM-PLS allows researchers to identify significant relationships between these variables and assist in the development of a more sustainable business integration model.

RESULTS

Inferential Statistical Analysis

The Structural Equation Modeling (SEM) method is an analytical tool used to simultaneously examine the relationships between various exogenous and endogenous variables that have multiple indicators. In this study, the SEM data processing technique is based on Partial Least Squares (PLS), utilizing SmartPLS version 3.0 software.

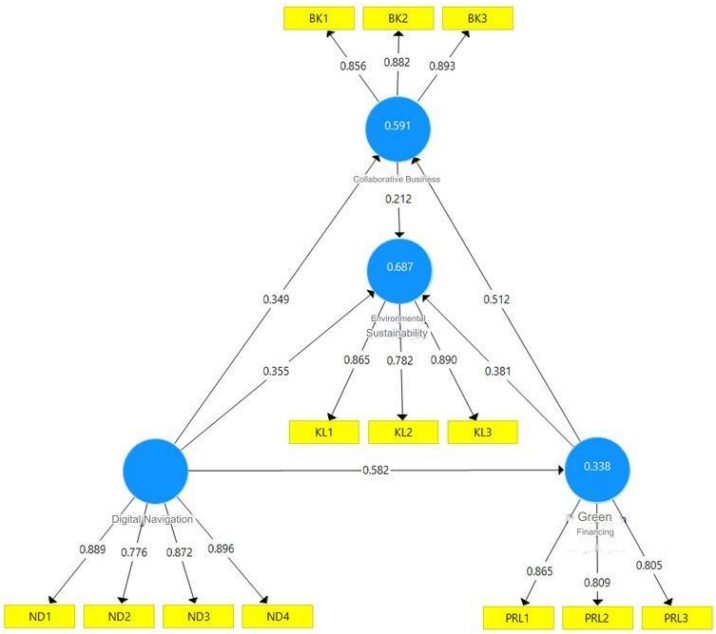

Figure 1. Valid Outer Loading Value of Research Items

Source: PLS Output, 2024.

Evaluation of Measurement Model (Outer Model)

Measurement model analysis is used to quantify the validity and reliability of a construct. A reflective measure is reported to be very valid if its correlation is greater than 0.60 with the construct it measures (Ghozali & Latan, 2015). There are 3 items when measuring the outer model, i.e., convergent validity, discriminant validity, and composite reliability.

a. Convergent Validity

Convergent validity is used to assess the validity of the relationship between each latent variable and its corresponding indicators. It is determined by examining the loading factor value. A research instrument is

considered valid if it has an outer loading value greater than 0.60 (Ghozali & Latan, 2015). The table below presents the outer loading results for each indicator of the exogenous and endogenous latent variables.

Table 1. Convergent Validity Test Results Through Outer Loading

Variables	Item	Outer Loading	Cut Off	Results
Digital Navigation	ND1	0.889	0.60	Valid
	ND2	0.776	0.60	Valid
	ND3	0.872	0.60	Valid
	ND4	0.896	0.60	Valid
Green Financing	PRL1	0.865	0.60	Valid
	PRL2	0.809	0.60	Valid
	PRL3	0.805	0.60	Valid
Collaborative Business	BK1	0.856	0.60	Valid
	BK2	0.882	0.60	Valid
	BK3	0.893	0.60	Valid
Environmental Sustainability	KL1	0.865	0.60	Valid
	KL2	0.782	0.60	Valid
	KL3	0.890	0.60	Valid

Source: Processed primary data, 2024.

Table 1 shows that all the items of the variables have been confirmed as valid and have passed the test for convergent validity criteria. Convergent validity can also be measured by the Average Variance Extracted (AVE) value. A measure is considered to be convergently valid if the AVE value of every variable is above 0.50, as suggested by Chin (1995) in Ghozali & Latan (2015). The convergent validity test results as reflected by the AVE value are shown in Table 2.

Table 2. Average Variance Extracted (AVE) Results

Variables	Cut Off	AVE	Results
Digital navigation	0.50	0.739	Valid
Environmentally friendly financing	0.50	0.683	Valid
Collaborative business	0.50	0.770	Valid
Environmental Sustainability	0.50	0.717	Valid

From Table 2, it can be identified that the variables used in describing the relationship between all indicators and the respective latent variables are digital innovation, green financing, collaborative business and environmental sustainability are said to be valid because they have met the AVE value exceeding 0.50. Therefore, these indicators are considered valid in measuring the research variables.

b. Discriminant Validity

Another validity measure that can be used to establish validity is discriminant validity. Discriminant validity is confirmed through a test of cross loading with the requirement that the outer value should be greater than the correlation value between the indicator and other constructs. Table 3 shows the outcome of the discriminant validity test.

Table 3. Results of Discriminant Validity Test (Cross Loading)

Item	Variables			
	Digital Navigation	Green Financing	Collaborative Business	Environmental Sustainability
ND1	0.889	0.498	0.554	0.640
ND2	0.776	0.449	0.420	0.534
ND3	0.872	0.480	0.577	0.524
ND4	0.896	0.562	0.646	0.729
PRL1	0.658	0.865	0.700	0.531
PRL2	0.541	0.809	0.530	0.433
PRL3	0.627	0.805	0.524	0.471
BK1	0.594	0.634	0.856	0.585
BK2	0.548	0.626	0.882	0.693

Item	Variables			
	Digital Navigation	Green Financing	Collaborative Business	Environmental Sustainability
BK3	0.560	0.620	0.893	0.596
KL1	0.582	0.592	0.550	0.865
KL2	0.458	0.636	0.588	0.782
KL3	0.746	0.650	0.668	0.890

Source: Processed primary data, 2024.

Based on the cross loading values in Table 3, it can be observed that the outer loading value for each item is higher than its corresponding cross loading value. This indicates that each indicator effectively measures its intended latent variable. Additionally, the latent variables meet the criteria for discriminant validity, confirming that they are distinct from one another.

Hypothesis Testing Results

Hypothesis testing is conducted to evaluate the impact of business integration variables on environmental resilience. The SEMPLS results are presented in the following table.

Table 4. Direct Influence Test Results

Variables	Path Coefficients	t- statistics	p-values	Information
Digital navigation → Environmentally friendly financing	0.582	17,815	0,000	Significant
Digital navigation → Collaborative Business	0.349	7,513	0,000	Significant
Environmentally friendly financing → Collaborative Business	0.512	11,903	0,000	Significant
Digital navigation → Environmental Sustainability	0.355	5,721	0,000	Significant
Environmentally friendly financing → Environmental Sustainability	0.381	7,872	0,000	Significant
Collaborative Business → Environmental Sustainability	0.212	3,042	0.002	Significant

Source: Processed primary data, 2024.

Based on table 4, it can be explained that digital navigation has an effect on environmentally friendly financing. Digital navigation has an effect on collaborative business. Environmentally friendly financing has an effect on Collaborative Business. Digital navigation has an effect on Environmental Sustainability. Environmentally friendly financing has an effect on Environmental Sustainability. Collaborative Business has an effect on Environmental Sustainability, as evidenced by a p-value of less than 0.05.

DISCUSSION

The Impact of Digital Navigation on Green Finance

Digital navigation has an impact on green finance. This shows that digital navigation has had a significant impact on green finance, changing the way funds are accessed, managed, and distributed for sustainable projects. Information and communication technologies in the financial sector have increased the accessibility of green finance, enabling the participation of investors from various backgrounds through online investment platforms and mobile applications. Innovations in financing models have also emerged as a result of digital navigation, such as green crowdfunding and peer-to-peer lending for green projects. Bento et al. found that technology-based crowdfunding platforms have significantly increased access to financing for small and medium enterprises focused on green solutions (Bento et al., 2019). Digital platforms also play a role in raising awareness and education about environmental issues and green investment opportunities. The use of digital platforms increases investors' awareness and intention to invest in sustainable projects. However, digital navigation also brings challenges. The digital divide, as Ragnedda & Ruiu (2020) have demonstrated, can create inequities in access to green financing. Jorgenson & Vu, (2016) that concerns about data security could hinder the full adoption of digital solutions in green financing. In addition, Torelli et al. (2020) showed that the ease of promotion through digital platforms can increase the risk of greenwashing, where companies exaggerate environmentally friendly claims.

The Impact of Digital Navigation on Collaborative Business

The Impact of Digital Navigation on Collaborative Business. The development of information and communication technology has enabled the creation of digital platforms that facilitate collaboration between companies, individuals, and even between different sectors. This phenomenon has changed the way businesses operate, communicate, and create value. One of the main aspects of the impact of digital navigation on collaborative business is the increase in accessibility and connectivity. Digital platforms such as mobile applications, social media, and cloud computing have eliminated geographical and temporal boundaries, enabling real-time collaboration between business partners in various locations. Research conducted by Nambisan et al. (2019) shows that digital technology has accelerated the collaborative innovation process by facilitating the efficient exchange of ideas and resources.

In addition, digital navigation has enabled the emergence of new collaborative business models. The sharing economy is one prominent example, where digital platforms enable individuals and organizations to share underutilized resources. A study by Sutherland & Jarrahi (2018) explains that platforms such as Uber and Airbnb have transformed the transportation and accommodation industries through collaborative business models enabled by digital technology. Transparency and trust, which are key elements in collaborative business, have also been enhanced through digital navigation. Blockchain technology, for example, offers a new way to build trust in business transactions and collaboration. Tapscott & Tapscott (2018) argue that blockchain can revolutionize the way companies collaborate by creating an immutable and transparent record of transactions.

The impact of digital navigation on collaborative business also brings challenges. Data security and privacy issues are becoming major concerns as digital information exchange increases. Research by Teece & Linden (2017) emphasizes the importance of a strong data management strategy in an increasingly complex digital business ecosystem. Furthermore, digital navigation has changed the power dynamics in business collaboration. Digital platforms often act as powerful intermediaries, sometimes dominating the business ecosystem. Kenney & Zysman (2016) discuss this phenomenon, showing how digital platforms can reshape the relationships between producers, consumers, and workers in the platform economy. However, the potential of digital navigation in increasing efficiency and innovation in collaborative businesses cannot be ignored. A study by McAfee et al. (2012) shows how companies that adopt data-driven decision-making in their collaborations tend to be more productive and profitable.

The Impact of Green Financing on Collaborative Business

Green finance has had a significant impact on the development of collaborative businesses, creating new opportunities while driving changes in conventional business practices. This phenomenon has changed the way companies collaborate, innovate and create value, with a focus on environmental sustainability as a shared goal. One of the main impacts of green finance on collaborative businesses is the emergence of innovative cross-sector partnerships. Companies from various industries are now partnering to develop green solutions, driven by the availability of dedicated financing for sustainable projects. Research conducted by Bos-Brouwers (2010) shows that collaboration between large companies and SMEs in the context of sustainable innovation is often facilitated by green finance schemes.

Green finance has also driven the creation of new collaborative business models focused on the circular economy. Resource sharing and exchange platforms, aimed at reducing waste and increasing resource efficiency, are increasingly emerging. A study by Bocken et al. (2014) explains the important role of finance in supporting the transition to more sustainable and collaborative business models. Furthermore, green finance has increased transparency and accountability in collaborative businesses. Investors and financial institutions providing green finance often require rigorous reporting on the environmental impact of funded projects.

The impact of green finance on collaborative businesses also brings challenges. Strict criteria for obtaining green finance can create barriers to entry for some companies, especially SMEs that may struggle to meet the requirements. Rizos et al. (2016) identified access to finance as one of the main barriers for SMEs in adopting circular economy practices and participating in green collaborations. On the other hand, green finance has driven innovation in collaborative financial structures. Green bonds and co-investment funds for green projects are examples of how green finance has facilitated financial collaboration between companies. Research by Scholtens (2017) shows that these financial instruments not only mobilize capital for green projects but also encourage collaboration between investors and companies in managing environmental risks.

Furthermore, green financing has influenced the power dynamics in collaborative business ecosystems. Companies that are able to access and utilize green financing often become leaders in collaborations, shaping the direction and priorities of joint projects. Thus, the ability to access and manage green financing has become an important competitive advantage in collaborative businesses.

The Impact of Digital Navigation on Environmental Sustainability

Digital navigation has had a significant impact on efforts to improve environmental resilience. The development of information and communication technology has opened up new opportunities to monitor, analyze, and respond to environmental challenges in a more effective and efficient manner. This influence can be seen in various aspects related to environmental management and efforts to maintain its sustainability. One of the main impacts of digital navigation on environmental resilience is the increased ability to monitor environmental conditions in real time. Research conducted by Guo et al. (2015) shows that the use of sensor technology and IoT has increased the accuracy and speed in detecting environmental changes, allowing for a faster response to environmental threats. Furthermore, digital navigation has facilitated more complex and in-depth analysis of environmental data. A study by Reichstein et al. (2019) illustrates how machine learning can be used to improve our understanding of climate change and ecosystems, providing a stronger basis for environmental policy decision-making.

Digital navigation has also changed the way people interact with their environment. Mobile applications and digital platforms have increased environmental awareness and encouraged public participation in conservation efforts. A study by Jepson & Ladle (2015) showed that citizen science applications have enabled the general public to contribute to scientific research on biodiversity, increasing public engagement in environmental conservation. Yang et al. (2017) explained that digital technology has increased the efficiency of water use in precision agriculture, contributing to food security and water conservation.

The impact of digital navigation on environmental sustainability also brings challenges. The increasing use of digital devices and information technology infrastructure has increased energy consumption and the production of e-waste. Belkhir & Elmeligi (2018) describe the significant carbon footprint of the information and communication technology industry, indicating the need for a more holistic approach to assessing the environmental impact of digital solutions. On the other hand, digital navigation has opened up new opportunities for the circular economy and resource efficiency. Sharing platforms and blockchain technology have facilitated more efficient use of resources and waste reduction. Research by Pagoropoulos et al. (2017) illustrates how digital technologies can support the implementation of circular economy business models, contributing to the reduction of resource use and emissions.

Online mapping raised the degree of transparency and responsibility in environmental stewardship. Digital supply chain trackers and blockchain support tracking the environment-related activities of firms better. Saberi et al. (2019) illustrate how this technology supports enhanced supply chain sustainability and encourages business practices that are more green-oriented.

The Impact of Green Financing on Environmental Resilience

Green finance has had a significant impact on efforts to improve environmental resilience. The allocation of financial resources to projects and initiatives aimed at preserving the environment and reducing negative impacts on ecosystems has played a significant role in promoting sustainable practices and increasing ecological resilience. This effect can be seen in many fields related to environmental management and actions for its sustainability. One of the key contributions of green finance to environmental resilience is the increase in investment in green technology and infrastructure. In accordance with research by Scholtens (2017), green finance has encouraged the development and use of renewable energy technologies, water-saving management systems, and sustainable agriculture. These investments not only reduce the pressure on natural resources but also enhance the resilience of ecosystems to climate change and other environmental stresses.

Green finance has facilitated large-scale conservation and restoration of ecosystems. Huwyler et al. (2014) argue that emerging financing mechanisms such as green bonds and payments for ecosystem services have raised funds for conservation activities that previously could not raise funds. This has contributed to greater protection and restoration of area, thus improving the overall resilience of the ecosystem. Green finance has also encouraged innovation in sustainable business operations. Chava (2014) found that companies that have access to green finance tend to be more innovative in producing green products and processes. Not only do these innovations reduce the

negative impacts of business operations on the environment, but they also introduce new solutions for existing environmental issues. Green finance has played a crucial role in improving natural disaster and climate change impacts resilience in environmental risk management. Research by Tanner et al. (2015) points out that green finance instruments, to a great extent, have funded investment in climate-resilient infrastructure and early warning systems that have increased communities' and ecosystems' resilience to natural disasters.

The impact of green finance on environmental sustainability also faces challenges. The issue of greenwashing, where projects that claim to be environmentally friendly actually have minimal or even negative positive impacts, is a concern. A study by Torelli et al. (2020) warns about the risks of greenwashing in green finance and the importance of strict standards and verification to ensure real positive impacts on the environment. On the other hand, green financing has encouraged the development of a circular economy and more efficient resource management practices. Ghisellini et al. (2016) explain that financing for circular economy projects has contributed to waste reduction and increased resource use efficiency, which in turn increases environmental resilience.

The Impact of Collaborative Business on Environmental Resilience

Collaborative business is significantly responsible for enhancing environmental resilience. Business models with a focus on cooperation among firms, industries, and other stakeholders have opened up new opportunities of addressing environmental issues more effectively and sustainably. This effect is in many facets of environmental management and tries to maintain its sustainability. One of the greatest impacts of collaborative business on environmental resilience is making resource utilization more effective. Collaborative business, through sharing of resources, avoiding redundancy, and optimizing supply chains, makes the businesses more efficient. Research conducted by Geissdoerfer et al. (2017) shows that collaborative business models, especially in a circular economy, have contributed to reducing waste and maximizing material effectiveness. This not only reduces the pressure on natural resources but also minimizes the environmental impact of industrial activities.

Collaborative business has enabled green innovation. According to a study by Nidumolu et al. (2014), collaboration with research organizations and businesses has advanced green technology and sustainability innovation. By sharing risk, knowledge, and resources, companies are able to overcome innovation hindrances that might otherwise be difficult to acquire on their own. Collaborative businesses have also increased the size and range of sustainability initiatives. Through strategic partnerships, companies can increase the reach of their environmental work. Gray & Stites (2013) created the possibility to conduct conservation and restoration of ecosystems on a large scale by engaging in cross-sector partnership, which has facilitated the overall ecosystem resilience. Collective businesses, through supply chain management, have enhanced transparency and sustainability. Research by Tachizawa & Wong (2015) shows that collaboration among firms in the supply chain has improved tracing and managing environmental impacts throughout the product life cycle. This has promoted the creation of more sustainable practices in the industry.

Its impact on environmental sustainability is also being questioned. Cross-boundary coordination and differing interests of the partners could undermine the success of collaboration. The work of Stadtler (2018) warns against cross-sector partnership governance complexity and how good governance would be instrumental in pushing positive impacts on the environment. Collaborative business, however, has driven system change in the approach to embracing sustainability. Through collective industry initiatives and shared platforms, companies are able to address broader environmental challenges that may not have been solvable individually. Kiron et al. describe that the coming together of companies has enabled the establishment of industry-wide standards for sustainability and driven regulation changes that promote environmentally friendly practices. Moreover, collaborative business has propelled the degree of engagement and activism of stakeholders for sustainability. Cooperation with governments, NGOs, and local communities has allowed for an enhanced contextual and integrated approach to the environment. Fadeeva (2005) research is one instance that highlights how multi-stakeholder collaborations have improved the efficacy and credibility of sustainability.

REFRENCES

[1] Asadi, A., & Sularsih, H. (2022). Transformasi Digital dan Financial Technology Terhadap Peningkatan Pendapatan UMKM Dimasa Pandemi Covid-19 Di Kabupaten Pasuruan: Transformasi Digital, Financial Technology, Peningkatan Pendapatan UMKM. *Jurnal Paradigma Ekonomika*, *17*(3), 683–694.

[2] Belkhir, L., & Elmeligi, A. (2018). Assessing ICT global emissions footprint: Trends to 2040 & recommendations.

Journal of Cleaner Production, *177*, 448–463.
[3] Bento, N., Gianfrate, G., & Thoni, M. H. (2019). Crowdfunding for sustainability ventures. *Journal of Cleaner Production*, *237*, 117751.
[4] Bocken, N. M. P., Short, S. W., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production*, *65*, 42–56.
[5] Bos-Brouwers, H. E. J. (2010). Corporate sustainability and innovation in SMEs: Evidence of themes and activities in practice. *Business Strategy and the Environment*, *19*(7), 417–435.
[6] Candraningrat, I., Abundanti, N., Mujiati, N., & Erlangga, R. (2021). The role of financial technology on development of MSMEs. *Accounting*, *7*(1), 225–230.
[7] Chalimi, A. N. F., Herdinawati, S., & Asadi, A. (2022). Faktor kemajuan teknologi dan sumber daya manusia terhadap peningkatan pendapatan umkm era revolusi 4.0. *Referensi: Jurnal Ilmu Manajemen Dan Akuntansi*, *9*(2), 129–134.
[8] Chava, S. (2014). Environmental externalities and cost of capital. *Management Science*, *60*(9), 2223–2247.
[9] Coffee Jr, J. C., Lowenstein, L., & Rose-Ackerman, S. (1988). *Knights, raiders, and targets: the impact of the hostile takeover*. Oxford University Press, USA.
[10] Das, M., & Rangarajan, K. (2020). Impact of policy initiatives and collaborative synergy on sustainability and business growth of Indian SMEs. *Indian Growth and Development Review*, *13*(3), 607–627.
[11] Dethine, B., Enjolras, M., & Monticolo, D. (2020). Digitalization and SMEs' export management: Impacts on resources and capabilities. *Technology Innovation Management Review*, *10*(4), 18–34.
[12] Ekwere, N. (2016). Framework of effective risk management in small and medium enterprises (SMESs): a literature review. *Bina Ekonomi*, *20*(1), 23–46.
[13] Fadeeva, Z. (2005). Promise of sustainability collaboration—potential fulfilled? *Journal of Cleaner Production*, *13*(2), 165–174.
[14] Farida, I., & Setiawan, D. (2022). Business Strategies and Competitive Advantage: The Role of Performance and Innovation. *J. Open Innov. Technol. Mark. Complex*, *8*(3), 1–16.
[15] Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2017). The Circular Economy–A new sustainability paradigm? *Journal of Cleaner Production*, *143*, 757–768.
[16] Ghisellini, P., Cialani, C., & Ulgiati, S. (2016). A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems. *Journal of Cleaner Production*, *114*, 11–32.
[17] Ghozali, I., & Latan, H. (2015). *Partial Least Squares Konsep Teknik dan Aplikasi dengan Program Smart PLS 3.0*. Semarang: Universitas Diponegoro Semarang.
[18] Gray, B., & Stites, J. P. (2013). Sustainability through partnerships. *Capitalizing on Collaboration. Network for Business Sustainability, Case Study*, *24*, 1–110.
[19] Guo, H.-D., Zhang, L., & Zhu, L.-W. (2015). Earth observation big data for climate change research. *Advances in Climate Change Research*, *6*(2), 108–117.
[20] Hanim, L., Soponyono, E., & Maryanto. (2021). Pengembangan UMKM Digital di Masa Pandemi Covid-19. *Seminar Nasional Penelitian Dan Pengabdian Kepada Masyarakat*, *1*, 30–39.
[21] Hasan, N. A., Abd Rahim, M., Ahmad, S. H., & Meliza, M. (2022). Digitization of business for small and medium-sized enterprises (SMEs). *Environment-Behaviour Proceedings Journal*, *7*(19), 11–16.
[22] Huwyler, F., Käppeli, J., Serafimova, K., Swanson, E., & Tobin, J. (2014). Conservation Finance: Moving beyond donor funding toward an investor-driven approach. *Credit Suisse, WWF, McKinsey&Company*.
[23] Jepson, P., & Ladle, R. J. (2015). Nature apps: Waiting for the revolution. *Ambio*, *44*, 827–832.
[24] Jorgenson, D. W., & Vu, K. M. (2016). The ICT revolution, world economic growth, and policy issues. *Telecommunications Policy*, *40*(5), 383–397.
[25] Kenney, M., & Zysman, J. (2016). The rise of the platform economy. *Issues in Science and Technology*, *32*(3), 61.
[26] Liu, K. P., Chiu, W., Chu, J., & Zheng, L. J. (2022). The impact of digitalization on supply chain integration and performance: A comparison between large enterprises and SMEs. *Journal of Global Information Management (JGIM)*, *30*(1), 1–20.
[27] McAfee, A., Brynjolfsson, E., Davenport, T. H., Patil, D. J., & Barton, D. (2012). Big data: the management revolution. *Harvard Business Review*, *90*(10), 60–68.
[28] Nambisan, S., Wright, M., & Feldman, M. (2019). The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes. *Research Policy*, *48*(8), 103773.
[29] Nidumolu, R., Ellison, J., Whalen, J., & Billman, E. (2014). The collaboration imperative. *Harvard Business Review*, *92*(4), 76–84.
[30] Pagoropoulos, A., Pigosso, D. C. A., & McAloone, T. C. (2017). The emergent role of digital technologies in the Circular Economy: A review. *Procedia Cirp*, *64*, 19–24.
[31] Pascual, M. P. (2023). Digital Transformation Strategies for Small Businesses in the Philippines. *International Journal of Applied Engineering and Technology*, *5*(2), 97–100.
[32] Purbadharmaja, I. B. P., & Widanta, A. A. B. P. (2023). Keberlanjutan dan Inklusi Keuangan pada Pelaku UMKM Penerima BPUM di Provinsi Bali. *Jurnal Ilmu Sosial Dan Humaniora*, *12*(1), 108–119.

[33] Ragnedda, M., & Ruiu, M. L. (2020). *Digital capital: A Bourdieusian perspective on the digital divide*. Emerald Publishing Limited.
[34] Razali, S. K. M., & Azman, N. (2021). Pembelajaran dalam talian sepanjang pandemik COVID-19: Faktor akses internet dan sosioekonomi terhadap motivasi pelajar kolej komuniti. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, *6*(11), 1–14.
[35] Reichstein, M., Camps-Valls, G., Stevens, B., Jung, M., Denzler, J., Carvalhais, N., & Prabhat, F. (2019). Deep learning and process understanding for data-driven Earth system science. *Nature*, *566*(7743), 195–204.
[36] Rizos, V., Behrens, A., Van der Gaast, W., Hofman, E., Ioannou, A., Kafyeke, T., Flamos, A., Rinaldi, R., Papadelis, S., & Hirschnitz-Garbers, M. (2016). Implementation of circular economy business models by small and medium-sized enterprises (SMEs): Barriers and enablers. *Sustainability*, *8*(11), 1212.
[37] Saberi, S., Kouhizadeh, M., Sarkis, J., & Shen, L. (2019). Blockchain technology and its relationships to sustainable supply chain management. *International Journal of Production Research*, *57*(7), 2117–2135.
[38] Sanusi, A. (2011). *Metode Penelitian Bisnis*. Salemba Empat.
[39] Sarbana, B., Saleh, A., Fatchiya, A., & Firdaus, M. (2023). Analisis Efektivitas Komunikasi Pemangku Kepentingan untuk Keberlanjutan Bisnis UMK di Geopark Pongkor. *Jurnal Penyuluhan*, *19*(01), 104–116.
[40] Scholtens, B. (2017). Why finance should care about ecology. *Trends in Ecology & Evolution*, *32*(7), 500–505.
[41] Stadtler, L. (2018). Tightrope walking: Navigating competition in multi-company cross-sector social partnerships. *Journal of Business Ethics*, *148*, 329–345.
[42] Sularsih, H., & Nasir, A. (2021). Strategi UMKM dalam meningkatkan pendapatan dimasa pandemi Covid-19 guna mempertahankan kelangsungan usaha di era revolusi industri 4.0 (studi pada UMKM makanan dan minuman di Kabupaten Pasuruan). *Jurnal Paradigma Ekonomika*, *16*(4), 763–772.
[43] Sularsih, H., & Wibisono, S. H. (2021). Literasi keuangan, teknologi sistem informasi, pengendalian intern dan kualitas laporan keuangan UMKM. *E-Jurnal Akuntansi*, *31*(8), 2028–2040.
[44] Surya, B., Menne, F., Sabhan, H., Suriani, S., Abubakar, H., & Idris, M. (2021). Economic growth, increasing productivity of SMEs, and open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(1), 2–37.
[45] Sutherland, W., & Jarrahi, M. H. (2018). The sharing economy and digital platforms: A review and research agenda. *International Journal of Information Management*, *43*, 328–341.
[46] Tachizawa, E. M., & Wong, C. Y. (2015). The performance of green supply chain management governance mechanisms: A supply network and complexity perspective. *Journal of Supply Chain Management*, *51*(3), 18–32.
[47] Tanner, T., Surminski, S., Wilkinson, E., Reid, R., Rentschler, J., & Rajput, S. (2015). *The triple dividend of resilience: realising development goals through the multiple benefits of disaster risk management*.
[48] Tapscott, D., & Tapscott, A. (2018). *How blockchain will change organizations*.
[49] Teece, D. J., & Linden, G. (2017). Business models, value capture, and the digital enterprise. *Journal of Organization Design*, *6*, 1–14.
[50] Torelli, R., Balluchi, F., & Lazzini, A. (2020). Greenwashing and environmental communication: Effects on stakeholders' perceptions. *Business Strategy and the Environment*, *29*(2), 407–421.
[51] Tulungen, E. E. W., Saerang, D. P. E., & Maramis, J. B. (2022). Transformasi digital: Peran kepemimpinan digital. *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis Dan Akuntansi*, *10*(2), 1116–1123.
[52] Vrontis, D., Chaudhuri, R., & Chatterjee, S. (2022). Adoption of digital technologies by SMEs for sustainability and value creation: Moderating role of entrepreneurial orientation. *Sustainability*, *14*(13), 1–19.
[53] Yang, H., Du, T., Qiu, R., Chen, J., Wang, F., Li, Y., Wang, C., Gao, L., & Kang, S. (2017). Improved water use efficiency and fruit quality of greenhouse crops under regulated deficit irrigation in northwest China. *Agricultural Water Management*, *179*, 193–204.